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The Chemical Society, the Society of Chemical Industry, the Association of British Chemical Manufacturers the Institute of Chemistry, the Society of Public Analysts, the Faraday Society, the Institute of Brewing, the Society of Dyers and Colourists, the Society of Glass Technology, the Iron and Steel Institute, the Ceramic Society, the Institution of Gas Engineers, the Society of Leather Trade Chemists, the Royal Photographic Society, the Mineralogical Society, the Biochemical Society, the Oil and Colour Chemists' Association, the Institute of Metals and the Royal Agricultural Society.

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EDITORIAL

The Food Symposium

A MOST successful dinner appropriately ended the two days' discussion on bread and milk organized by that vigorous and enlightened body the Food Group. Food has been studied from time immemorial and long experience has evolved methods of selecting and cooking food that were at least satisfactory to those people who were in good health and had normal digestions and lived in the country or in towns where fresh meat, fresh vegetables, and fresh milk were easily obtained. The most suitable diet for those who are in poor health or whose digestive systems are unusually sensitive is a matter, we suppose, for the medical profession and this most difficult study has no doubt engaged the attention of many observant and capable members of that profession. Many factors have united to cause great changes in the lives of modern nations, and those who live in our cities find it necessary to bring in from a distance, and sometimes a great distance, the food that is consumed and in addition much less cooking is done at home than was the case a generation or two ago. Many town dwellers do hardly any cooking for themselves and rely on restaurants, tea-shops, and other houses that specialize in attending to the wishes of the hungry and thirsty. These new conditions have provided a host of most difficult and important problems of which the chemical problems are probably the most difficult and the most fundamental. A number of highly trained men spend the greater part of their lives in the investigation and solution of these problems and it is a matter of national importance that they have now organized a group for the advancement and diffusion of their knowledge, a group that can speak, with an authority not possessed by any other body, on those topics which constantly engage their attention and enlarge their experience. Government Departments, Medical Officers of Health, Public Analysts, and others are very observant of the effect on the public of any lack of attention to the best practice in matters of food. Those who are here engaged in forming this best practice have during this recent symposium had the great advantage of discussing their problems with several leading experts from the Continent and our literature has been enriched by a considerable number of valuable papers, most of which we published last week. The banquet held on Friday evening last was an ideal conclusion to the conferences and discussions that preceded it. It was held at the Trocadero and we venture to think that the most fastidious gourmets would have found nothing to criticize in the solid or liquid food, the comfort of the diners, the number or length of the speeches, or the delightful and amusing entertainment that followed the brief oratorical display. It is a long time since we were so much diverted as we were by the ingenious musician who performed on the cornet, violoncello, and other instruments, imposing his will on them and imposing on his audience, in most unexpected ways that delighted the already happy diners. We look forward to other conferences on beef and coffee, potatoes and

cider, tripe and onions, and other nuclei round which learning may collect, oscillate, and scintillate: and if the Food Group on such future occasions invites other distinguished visitors from foreign countries to participate in both theory and practice, it need not feel at all apologetic about it for the example now set before us cannot fail to stir up to a high standard all those who are called upon to organize such gatherings in the future.

New Uses for Trains

We read in the newspapers how the British engine, the Royal Scot, with eight coaches of the London Midland & Scottish Railway has visited Canada and the United States: the train ran more than eleven thousand miles, visited eighty towns and cities, and was visited by more than three million people. Everywhere she received an enthusiastic welcome and her long journey was one triumphant progress. We gather that she was regarded as a symbol of the Old Country and was greeted with sympathy and even sentiment. In the past it was the invariable practice for a train to go from one station to another and to return the same way. The Royal Scot has departed from this practice and other departures are taking place. A few months ago an exhibition train fitted with show cases and special samples made a prolonged tour on the Continent and attracted more than four hundred thousand visitors. Next spring a train of twenty corridor coaches, seventeen of which are specially fitted for the display of a variety of goods, will make a three months' tour visiting a number of towns in the Midlands and the South of England. Many people take long journeys to see the British Industries Fair or other great exhibitions: the latest idea is to take a trainload of well-selected samples from town to town, stopping a day or two to give customers the opportunity of inspecting the products of British enterprise. The train will leave Birmingham on March 14 and visit Shrewsbury, Cardiff, Bristol, Plymouth, Yeovil, Southampton, Brighton, Margate, Tunbridge Wells, Reading, London, Yarmouth, Cambridge, Nottingham, Manchester, Liverpool, Stafford, and a host of intermediate towns and is to return to Birmingham in the middle of June. We do not know which of the ordinary chemicals—whether fine or otherwise—are most adapted for this kind of publicity, but undoubtedly there are many things which chemical firms have to buy that will be found in this travelling shop front and justify a visit. In addition it would seem probable that fertilizers, disinfectants, drugs, soaps, polishes and all such substances as are required by ordinary human beings could be displayed in an attractive manner and brought to the notice of many people in many places. We confess that we wish some organization would bring to our door a train containing samples of the principal metals and alloys with a descriptive catalogue explaining the uses and virtues of each and a note stating which were the most liable to corrode. We are informed that the Continental exhibition train was a success and we see no reason why the forthcoming British experiment should not equally be a success. Much further information can be obtained from the promoters of this enterprise, British & Dominions Travelling Exhibitions, Ltd. of 29, Great St. Helen's, London, E.C. We shall be much interested to watch the progress of this interesting development.

Half a Century Ago

It was on the nineteenth of November fifty years ago that there passed from us an inventor whose work gave a powerful stimulus to British industry. Karl Wilhelm Siemens, a product of Magdeburg and Göttingen, came to this country at the early age of nineteen with the hope of interesting our manufacturers in an electroplating process devised in collaboration with his brother Werner. He evidently found support which was more favourable than that of his own country, for two years later he was back again; and from that second mission until his death in 1883 he chose England as the scene of his activities. To-day, our iron and steel industry has ascended from a slough of depression. Open-hearth furnaces in the North Lincolnshire area are creating world's records in production of steel, thus demonstrating to our foreign competitors that whilst we have temporarily lapsed in our efforts to keep records for speed in air travel we have in true British fashion won our spurs in other fields. And it is at this time when we are congratulating our steel manufacturers that we bear in mind the progress which was made in this industry after Siemens introduced his regenerative furnace. This was only perfected after Siemens had struggled for two years in a model steel works erected by himself. His record as mechanical engineer opened with his second and permanent visit to England, for the invention, which was afforded by our British patent laws a greater protection than by those of Germany, was the differential governor for steam engines. At the age of twenty-seven he was awarded the medal of the Royal Society of Arts for his regenerative engine condenser: and, indeed, in all his subsequent efforts for the interconversion of heat and work he was regarded as a worthy successor in a practical way of Joule. In the world of electrical engineering his inventions were legion. With his brother Werner he gave us the Siemens armature, followed some years later by the multiple coil armature. He designed the ship "Faraday" which successfully laid transatlantic cables, and the Siemens cables, which need no introduction. Electric pyrometers, thermometers, and bathometers for finding the depth of the sea are further examples of his fertile mind. The Siemens electric furnace, the Portrush electric tramway in Northern Ireland, and the giant concern for the manufacture of telegraph instruments, insulators, batteries, and other electrical products—is it possible that all these came from the brain of one man? And in these fifty years since his death, although we have made enormous advances with our bodies of inventors, yet we have difficulty in recalling any single inventor who has directed our British industry along so many paths of success. No wonder that this man who chose our nationality became Sir William Siemens, was honoured by many societies and by a memorial window in Westminster Abbey—an honour which is accorded to few scientific or industrial workers.

FOAM FIRE-FIGHTING METHODS: PAST, PRESENT, AND FUTURE*

By HENRY S. SIMONIS, I.L.D.

If I venture to bring before you again the question of foam as a weapon of attack against fire, the subject on which Mr. Anfilogoff read an excellent paper before this Institution three years ago, I have two excuses for doing so. The first is that I have been connected with foam methods from the designing side for 21 years and can give you many a peep behind the curtain. The second is that methods of foam fire fighting are at present undergoing, or may undergo, a fundamental change from chemical to mechanical foam production, and it may not be out of place to deal with the past devices, the present means, and the possibilities for the future of this important method of attacking fire.

The original development of foam for fighting fire is due to two men, first and foremost to Prof. Laurent of St. Petersburg and secondly to Mr. Urquhart of the United States. Prof. Laurent read a paper before the Chemical Section of the Imperial Russian Technical Institute in 1904 in which he reported successful fire extinguishing experiments: (*a*) by turning over two casks containing A and B solutions on to a burning pit containing naphtha, thereby creating a foam which covered the burning surfaces and cut them off from oxygen; (*b*) he pumped the two fluids into a chamber by twin pumps and thereby created a foam which extinguished a fire in a tank 35 ft. diameter; (*c*) he used buckets, divided into two sections by a partition which on being tilted over allowed the two fluids to mix; (*d*) he constructed closed receptacles which worked on the same principle and created an excess of CO_2 sufficient to discharge the foam under pressure.

It needs no further explanation to prove that it is on these principles that all foam fire-fighting systems using two solutions are founded: whether the apparatus be small or large, closed hand-firing extinguishers, or portable on wheels, operating either on the extinguisher principle, by using CO_2 compressed in cylinders, or by twin pumps; as well as by fixed installations on land or sea, worked by gravity, steam, or gas, or by Duplex pumps, etc.

The chemicals used are: for the A solution, aluminium sulphate about 13%, or aluminoferric; for the B solution, bicarbonate of soda about 8%, and a stabilizer like saponine, liquorice, or Turkey red oil to strengthen the wall of the bubbles (about 3%). The remainder of both solutions is water. The first apparatus on this system was introduced in 1912 to the London and Liverpool Fire Brigades and to the Bradford Dyers' Association in the form of hand extinguishers and twin first-aid apparatus.

* Read at the Tenth Annual Conference of the Institution of Fire Engineers at Blackpool, Sept. 1933.

A great variety of form and applications followed and this system held sway unchallenged till about 1925. By that time the American engineer Urquhart had followed up another idea of Laurent's, which the latter had expressed at the meeting previously referred to. "I can also make up the solutions as and when they are required if I have water available and the chemicals in easily soluble powder form." Urquhart invented an apparatus based on a cement gun by which water rushing through an injector drew powder into its stream and dissolved it in the water, forming foam in the tubing or hose. The same engineer patented, a few months later, a similar apparatus with two injectors, each drawing powders A and B respectively into the water and thus creating foam in the conduit pipe.

This so-called generator system was introduced first in the single powder type into the British Mercantile Marine and to the British Fire Brigades in 1926. It had some distinct advantages over the ready-made fluid system:

(1) It saved space and weight as the water was procured on the spot.

(2) It overcame, particularly in the two-powder system, the danger of the deterioration of the fluid which had to be changed once a year to be safe.

(3) It enabled an uninterrupted flow of foam as long as water and powder were available, and it did not limit the supply of foam to the capacity of the tanks.

A species of this invention is the foam gun, a German invention, which uses powder like an extinguisher charge, to be mixed with water when required. It has advantages (1) and (2) but lacks advantage (3). On the other hand it is easily manipulated until recharge.

A third method also indicated by Laurent in his lecture above mentioned has only recently been investigated. Laurent took a soda-water syphon in which he put saponine or a similar stabilizer, or alternatively he used a solution of saponine in a metal cylinder charged with CO_2 under pressure. In both cases he made about ten times the same quantity of foam. That is to say he produced foam by mechanical or physical means only and not by chemical means.

Along these lines valuable work has been done recently by Superintendent Schroder and Dr. Von Deurs of Copenhagen, where they put on the fire pumps a foam beater which draws water, air, or saponine in certain proportions and beat them mechanically into foam. The advantage of this system over all previous chemical systems is that it not only retains and enhances the saving in space and weight and the continuity of flow

it it reduces by about 90% the cost of foam. Thus enables the brigades to use it freely for instructional irposes, an essential advantage which is almost ohibited by the cost of chemical foam. By this system e use of foam is not restricted to the extinguishing burning liquids and it would be specially advantageous the case of fires where there is a scarcity of water, ereby increasing tenfold the fire-fighting efficiency the installation. The Ellehammer pump has also en used in connexion with this system.

Denmark and Sweden have gone over to mechanical am. In France and Germany a few machines have en built using compressed air or the exhaust gas the engine to create foam from saponine. Of this ird method only first attempts have been made in is country, but not with very successful results owing incipally to the uncertainty of the position in relation patent rights. Consequently progress in this rection has been arrested. If this Institute could t over this legal difficulty it would bring about the troduction into this country of what promises to be a ry effective method of combating liquid and other es by foam. Theoretical and intrinsic reasons favour echanical foam, and these are excellently put forward Chief Officer Frijs of the Copenhagen Fire igade.

In chemical foam most of the chemicals are wasted creating CO_2 used up without extinguishing value

TABLES OF APPROX. COVERING CAPACITY

Capacity 30 cb. ft. per minute or about 200 gal.

Depth of foam in inches	Area covered per minute in sq. ft.	Length of side of square of same area (to nearest inch) ft.	in.	Time required to cover 100 sq. ft. min.	sec.
1	360	18	10	0	17
2	180	13	5	0	33
3	120	10	11	0	50
4	90	9	6	1	7
5	72	8	6	1	24
6	60	7	9	1	40
8	45	6	9	2	14
10	36	6	0	2	48
12	30	5	6	3	20

Capacity 80 cb. ft. foam per minute or about 500 gal.

Depth of foam in inches	Area covered per minute in sq. ft.	Length of side of square of same area (to nearest inch) ft.	in.	Time required to cover 100 sq. ft. min.	sec.
1	960	30	11	0	6·3
2	480	21	11	0	12·6
3	320	17	11	0	19
4	240	15	6	0	25
5	192	13	10	0	32
6	160	12	7	0	38
8	120	11	0	0	51
10	96	9	9	1	3
12	80	8	11	1	15

d useless as far as the actual foam is concerned. With emical foam we may assume that 1 lb. of powder th 1 gal. of water gives 8 gal. of foam, or 100 lb. of powder with 100 gal. of water gives 800 gal. of foam. In mechanical foam, 2 lb. of saponine solution with 100 gal. of water gives 1000 gal. of foam. That is to say 49/50 of the chemical is saved, as air takes the place of chemically-created CO_2. As 100 lb. of foam powder cost nearly £5 and 2 lb. of saponine solution cost about 10s., 90% of the cost is saved. The mechanical foam is scientifically the happier, and therefore practically the better, solution. Furthermore the mechanical foam offers less friction and is more easily conducted through long lines of hose. It is less dangerous to fabric as it contains no chemicals. It is more stable, being filled with air, as compared with foam filled with CO_2, and has a far greater electric resistance.

A column of mechanical foam, 40 in. by 4 in. by 4 in., has a resistance of 70,000 ohms against 1940 ohms resistance of water, or 670 ohms resistance of chemical foam. The disadvantage, if any, is the need of mechanically-driven apparatus, viz., the need of a specially-fitted motor pump or a trailer pump, either of which is, however, preferable to the carrying of large quantities of powder and portable apparatus.

A 40-gal. tank of saponine solution will make 200,000 gal. of foam, equal to 8 tons of powder. These figures will be sufficient for every fire engineer to gauge the practical importance of this third application of Prof. Laurent's revolutionary theory of foam fire fighting.

In conclusion I would like to give a few practical hints of fire fighting with foam which are the result of many years of practical experience under varying conditions:

The delivery outlets should be of ample diameter, considering that the volume of foam is about eight times the volume of water. Not more than 250 to 300 gal. of foam should be carried over a single line of $2\frac{1}{2}$-in. or $2\frac{3}{4}$-in. hose. Use rubber-lined hose for preference, not only for reason of friction reduction, but also for better conservation of hose and easier cleaning. Avoid, as far as possible, kinks, obstructions, and rising ground for the hose. Use large nozzles or take the nozzle off the branch. Under no circumstances use wet hose. Do not direct the foam stream into the burning liquid but against a wall for recoil, or drop it gently from the air, or let it ooze out from a wide opening where possible.

In ships' installations, use adjustable sprinkler heads for even distribution of the liquid to all parts far or near, use dry pipes and cover the bilges well. In tank installations use floating outlets or bend inlets to ensure that the foam need not fall deep or through the flames.

Use different gear for foam than for water, for instance, white nozzles, branches and couplings, and see that the men know the difference between handling foam and handling water. Foam lines should not be less than 50 to 100 ft. and not more than 200 to 300 ft. in length if possible.

As in all matters connected with fire fighting, only the combination of theory, construction, and practical fire fighting can give really good results.

I trust that this short paper will stimulate further interest in the possible applications of foam and will enhance its usefulness for the British service.

MASTIC ASPHALT ROOFING

By D. M. WILSON

INTRODUCTION

Mastic asphalt has been used in the building trade for more than sixty years for the roofing, flooring, and damp-proofing of important buildings. No failures have been experienced in those cases where the mastic was composed of good quality asphalt rock, and a proportion of a naturally occurring bitumen. Within recent years it has become the practice among certain sections of the industry to adulterate the asphalt rock with a proportion of limestone, and often to omit the rock altogether on the score of cheapness.

No ready means exist of forecasting how a mastic mixture will behave when exposed to weathering for long periods. The surest way to attain success is to study the composition of the materials which have proved themselves to be satisfactory by the test of actual service over many years, and to imitate their composition as far as possible. For this reason the results of the detailed examination of a number of samples cut from old roofs may be of interest.

DESCRIPTION OF SAMPLES

Roof No. 1. This was laid in 1892—no repairs have been necessary, and the roof is still in excellent condition.

Roof No. 2. Laid 1912—the asphalt is still in excellent condition and no repairs have been required.

Roof No. 3. Laid 1890—Fig. 1 shows the present weathered condition of this roof—no repairs have been *required even after 43 years' exposure.*

Roof No. 4. This roof laid only a few years ago cracked extensively—a portion is illustrated in Fig. 2.

Analysis results.—The samples were found to possess the following properties:

	1	2	3	4
% bitumen soluble in CS_2	13·6	13·7	12·7	13·3
% mineral aggregate—(B.S.I. sieves)				
Passing 200	41·2	50·0	43·6	34·7
,, 100	5·1	7·0	5·0	11·4
,, 85	0·6	1·0	0·6	2·4
,, 52	2·7	3·6	2·4	9·8
,, 36	1·8	3·4	2·2	8·7
,, 25	0·6	2·0	0·6	5·2
,, 18	2·7	3·6	2·8	7·6
,, 8	19·5	12·7	20·3	6·9
,, $\frac{1}{8}$ in.	11·5	3·0	8·8	—
,, $\frac{1}{4}$ in.	0·7	—	1·0	—
	100·0	100·0	100·0	100·0
Bitumen content (calculated on ungritted material)	18·7	16·8	17·7	13·3
Recovered bitumen (penetration at 25° C.)	28	23	26	28
Grit content	27·5%	18·8%	28·2%	nil
Fluorescence colour of mineral aggregate under ultra-violet light	light brown	light brown	light brown	dark brown
Hardness No.	15	11	9	10

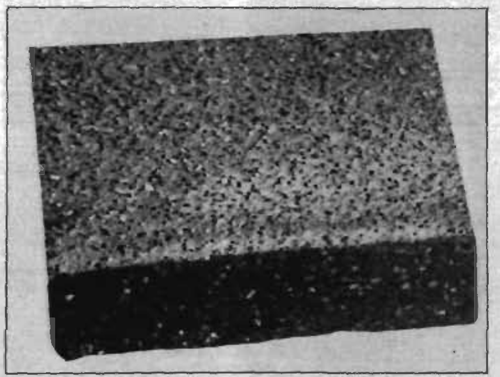


FIG. 1

Mastic asphalt cut from a roof still in good condition after 43 years' service

Discussion of results.—The samples taken from roofs No. 1, 2, and 3 all show the high percentage of material passing 200-mesh typical of mastics made from a good-quality asphalt rock, and contain a fairly high proportion

of grit. The mastic taken from the fourth roof which failed contained no grit and shows a lower proportion of 200-mesh material with a correspondingly higher percentage of passing 100 and the coarser meshes; the aggregate can be seen under the microscope to consist of a crystalline limestone. Under ultra-violet light the mineral aggregates for Nos. 1, 2, and 3 show the light brown colour given by a good asphalt rock, while that from the failed mastic is dark brown in colour.

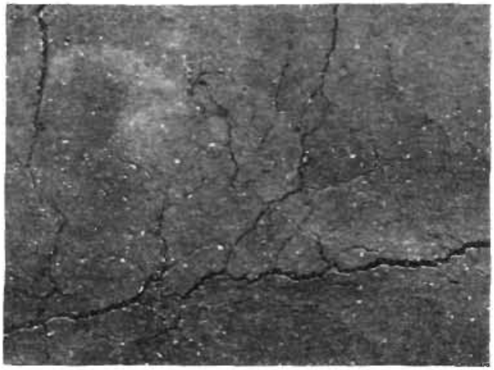


FIG. 2
Mastic asphalt cut from a roof which failed

Another interesting feature is that for approximately the same stability, as indicated by the hardness number the failed roof shows a much lower bitumen content when this is calculated as a percentage on the ungritted material. This low bitumen carrying capacity is typical of most synthetic roofing mastics: they are therefore less likely to be weatherproof and waterproof than the natural rock mastics which can carry a higher percentage of bitumen without loss of stability.

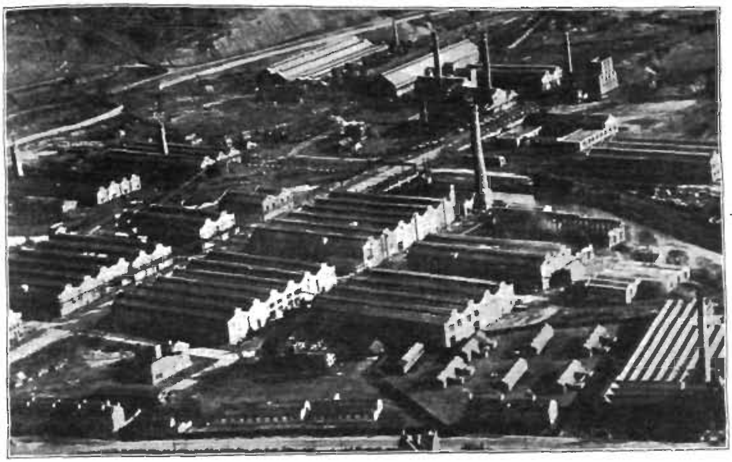
BRITISH DYESTUFFS CORPORATION, LTD.

DALTON WORKS

An adequate article on the Dalton works of the British Dyestuffs Corporation would be not so much a description of a factory as a treatise on town planning. Recently we were privileged to pay a visit to the factory and at the commencement of our tour of the works we were informed, amongst other things, that the works contained 18 miles of standard-gauge railway. After our tour lasting a day had finished, this and many other similar statements lost their quality of surprise. Looking back, we seem to have met Billingham's junior brother. "Junior" is perhaps not quite the word, for Dalton is not a youngster by any means, but we seem to have noticed a facial resemblance.

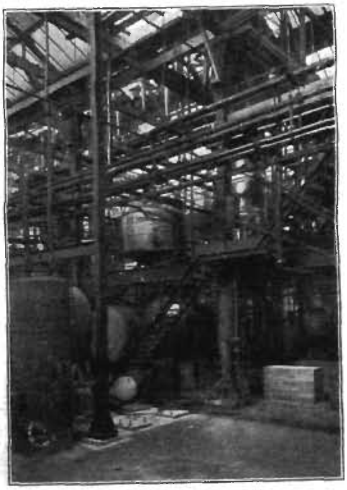
The Dalton works dates from 1915, when Brit Dyes, Ltd. was formed from Read Holliday & So Ltd. It is therefore a direct link in the chain wh began with one of this country's first dye-making co cerns, and to-day it is the largest factory of the Dyestu Group of Imperial Chemical Industries, Ltd., in wh.ch British Dyes, Ltd.'s successor—the pres Corporation—became absorbed in 1926. The origi plan of the works was on a generous scale, and the pl has been largely preserved. Many of the war-ti features have become obliterated, but there are st some to be seen, for example, the oleum plant of whi two units now work alongside the ghosts of ten othe But most striking now on entering the factory are t wide avenues and the red-brick buildings, well-spac and roomy inside, and along the avenues and in eve part of the works, the overhead pipe-lines that are us for conveying power and material.

"Dalton" seems a very good name for a chemi works, although it comes not from the famous chem but from the parish in which the factory is situat a mile or two out of Huddersfield. Here the Corporati has 450 acres, and there are buildings covering 25 them. The group of buildings is divided into two the River Colne; on one side is the "services" side the works, with all the power plant and departme for manufacturing heavy chemicals and primari whilst on the other side are the plants manufacturi intermediates and colours, the grinding and mixi plant, and the laboratories. Our tour began the services side, where water for general purposes first pumped from the river to a 2,000,000-gall reservoir on the neighbouring hill-top, a pure s water for process purposes being obtained from t Huddersfield Municipal Supply. The boiler stati has six Stirling water-tube boilers each with a capaci



Aerial View of the Works

Typical Building Designed to give Maximum Ventilation



The Corner of a Modern Plant

of 25,000 lb. of steam per hour at 220 lb. pressure, and this is released to the factory at a pressure of 40 lb. per sq. in. Mond gas is also available for heating, and compressed air is used for many processes. In addition, there is a power station generating power at 3000 volts and this is transformed to 400 volts for factory purposes. There are also two ammonia-compression ice-making plants, making together some 150 tons per day and brine equivalent to another 60 tons. Both ice and brine are used for a number of low-temperature reactions.

Leaving the services area we came to the benzol *plant. Benzol is received from coke-oven factories in* tank-wagons and stored in a number of long cylindrical tanks of 30,000-gallon capacity, and it is distilled in one of the largest cast-iron fractionating columns erected in this country. Apart from its size this still possesses a number of features of interest, notably the provisions made for safety and efficiency of operation, points that we were to see emphasized in almost every department of the works. Recording instruments are to be seen everywhere, and particular attention has been given to remote control. In this plant, for instance, a sample of any of the fractions can be taken by a man at ground level—there is no need for him to make hurried trips from level to level. The operation of the plant can be examined on a central control panel, a feature that was noticeable in several other departments.

The distillation products are conveyed by pipe-lines to the nitrating plant, and this building has been built in a way that deserves comment, for we have not seen the method employed elsewhere. The bricks of the walls, as can be seen in the accompanying photograph, are built up in a chequer pattern of bricks and spaces, thus combining many of the features of a closed-in building and an outside plant, and the air, which normally may become somewhat toxic in the neighbourhood of such plant, is maintained comparatively fresh. Nitro products are then conveyed to the aniline building, where they are reduced to aniline, toluidines, xylidines, chloranilines, etc.

Adjacent to this building is the oleum plant, the units of which are of a modified Grillo type incorporating electrostatic precipitation plant for the removal of dust and mist from the SO_2, a process which ensures long life of the catalyst employed. We next passed to the intermediates department, where naphthalene is nitrated, sulphonated, reduced, and passed through other processes to produce many of the intermediates used in colour manufacture. One complete building is devoted to β-naphthol, others to naphthol-sulphonic acids and derivatives, and there are special plants for manufacturing naphthylamines, diamines, etc. These intermediates pass into a warehouse from which they are drawn as required by the colour-manufacturing departments.

The colour departments are divided into two groups, the first concerned with dyestuffs the second with triphenyl methane dyestuffs. Dyestuffs are manufactured in two sheds, which are chiefly notable for the excellent way in which they illustrate the possibility of using standard equipment for a large number of related processes. The reactions are carried out in huge tubs, tiered in rows one above the other for the various couplings, and it was an amazing experience to walk along a gangway high above the tubs and watch their swirling contents of red, orange, green, and other colours. Near to the azo shed is the special plant manufacturing the "Edicol" dyes used in foodstuffs, a plant which uses only the purest intermediates tested for their contents of arsenic and lead, and which is kept scrupulously clean.

The alkylaniline section of the triphenyl methane department is one of the most recent to have been built, and much of the experience gained in other departments has been used to good advantage. It preserves the tiered arrangement used in many *dyestuffs works, but instead of gloomy closed-in wooden* structures, there are metal structures which allow the whole plant to be well-lighted, and centralization of control has eliminated much of the necessity for workmen to move from one level to another. Close to this building are the departments in which many of the older dyestuffs—Magenta, Malachite Green, Methyl Violet, etc.—are made, and since many of these brilliant products find their market mainly in the East, it was interesting to see the care taken to produce them in as perfect crystalline states as possible.

Finally, we came to the grinding, mixing, and standardizing plant, into which the dyestuffs are received from various departments in lump form. After testing, the dyestuffs are ground and then standardized by admixture with other dyestuffs and standardizing agents—for, as we were reminded, "the dyestuff-making trade sells an effect rather than a product," and the final test of each dyestuff is made by dyeing under conditions as near as possible to those in which the bulk will be used. The testing of the final products is however, only a part of the work of the extensive laboratories, for every stage of production is accompanied by the most careful scrutiny of the materials employed. The extent of this work can be gauged from the fact that of the 1700 persons employed in the Dalton works, 300 are staff men, many of whom are chemists working in the laboratories.

Many other features of the works can be touched on only briefly here. There are the facilities everywhere enabling workmen to wash and change, to eat under good conditions, and to obtain medical treatment. A monthly medical examination is compulsory in several departments. There is Dalton Grange, the house on the hill-side that has been converted into a fine club-house—the result, we believe, of an idea of Sir Martin Forster during the time he served as a government director of the factory in the war years. From here, too, one can look down on the fields below Dalton Grange, and see the larger club-house and sports fields of the Corporation, with a square of bowling green looking, even after the summer of 1933, as though it had been dyed with the Corporation's own Malachite Green, but the result, we surmise, rather of Cumberland turf and Billingham ammonia. This is the Dalton works of the British Dyestuffs Corporation, where some 1500 dyestuffs are now manufactured, products which by their good qualities have been so largely responsible for the advance which the industry in England has made in the post-war years to a position that such pioneers as Perkin, Greville Williams, Ivan Levinstein, E. C. Nicholson, and Read Holliday might consider of fitting eminence.

ACADEMIC ASSISTANCE COUNCIL

A meeting of the Academic Assistance Council, under the presidency of Lord Rutherford, O.M., F.R.S., recently reviewed the work accomplished during its first six months in assisting University teachers and investigators who, on grounds of race, religion, or political opinion, are unable to carry on their work in their own countries.

The Council has established a temporary office in rooms lent by the Royal Society, and has collected records of about 1000 displaced scientists and scholars. It has put this information at the disposal of similar committees in this country and abroad, particularly in America. Of these 1000, many of whom are of international reputation, 132 have been given temporary research facilities in the Universities and University Colleges of Belfast, Birmingham, Bristol, Cambridge, Cardiff, Edinburgh, Glasgow, Hull, Leeds, London, Manchester, Nottingham, and Oxford. In 42 instances the Council has made maintenance grants for one year, and has helped in a number of other instances, by advice or by the temporary offer of help which has not ultimately been needed. Its grants are limited to £250 per annum for a married and £182 for an unmarried person.

Donations received by the Council up to November 4 amounted to £9695 14s.: this includes a donation of £500 from the Council of Trinity College, Cambridge, through the Master, Sir J. J. Thomson, O.M., F.R.S.

Unless a further substantial sum is available the Council can make no more grants, although it has many urgent and well-authenticated cases; nor can it extend for a second year any grants already made. In this event, a number of distinguished scholars and scientists now being assisted will have to leave Great Britain before they have found permanent posts in other countries. The Council is making inquiries throughout the world to discover permanent or semi-permanent openings for these persons: it realizes, however, that an extension of many of its grants will be needed while these inquiries are proceeding. The Council is taking every care not to prejudice the interests of any teachers in the universities of this country or persons intending to follow an academic career.

The issue, as the Council stated last May, is not a Jewish one alone; many who have suffered or are threatened have no Jewish connexion, nor, though raised acutely at the moment in Germany, is it necessarily confined to that country. The Council's aims are in no sense political, the principle at stake is the general one of intellectual freedom.

The Council intends immediately to appeal for further funds, but to avoid a multiplication of public appeals of a similar character it has decided to issue its own in co-operation with the International Student Service, the Refugee Professionals Committee and the German Emergency Committee of the Society of Friends. Contributions—earmarked if desired for the Academic Assistance Council—may be sent to Walter Adams, the General Secretary of the German Refugees Assistance Fund (Academic and Professional) at 232, Abbey House, Westminster, S.W.1. (Telephone: Victoria 5927.)

SOCIETY OF CHEMICAL INDUSTRY

OFFICIAL NOTICES

Decennial Index to British Chemical Abstracts. The preparation of the Decennial Index to Abstracts "A" and "B," covering the years 1923–32 is making great progress and it is hoped to publish the names' section early in 1934.

Those guarantors who ordered their copies with a deposit of 10s. in the early stages of its preparation will be called upon shortly to complete their preferential subscription by a further payment of £3 3s. 6d. To other members of the Society the price is £4 3s. 6d. and to the general public £8 (post free in all cases).

Subscriptions should be addressed to the Secretary, Bureau of Chemical Abstracts, 46, Finsbury Square, London, E.C.2, and remittances should be crossed "A/c Decennial Index."

It may be of interest to know that the fees will provide only part of the cost, the balance having been secured by contributions of £4500 from the Societies.

New Materials Group. An important step in the formation of the new Group will be taken on Thursday, December 7, when a meeting of those interested will be held at The Institute of Chemistry, 30, Russell Square, W.C., at 8 p.m., to approve or amend (1) the draft rules, (2) the selection of the preliminary officers and executive, (3) the proposed title: "Road and Building Materials Group."

Ramsay Chemical Dinner, Central Hotel, Glasgow, Friday, December 8. Dinner, 7 p.m. Dancing till 2 a.m. Tickets, 14s. 6d. each. Apply immediately to J. C. McCallum, 10, Midlothian Drive, Glasgow, S.1. *Vide* JOURNAL, p. 945.

Newcastle Section. It will avoid delay if members will address the Hon. Secretary correctly, viz., Mr. J. W. Craggs, 4, St. Nicholas Buildings, Newcastle-on-Tyne.

BIRMINGHAM AND MIDLAND SECTION

A joint meeting of the Birmingham and Midland Section and the Plastics Group of the Society was held at the University of Birmingham on Tuesday, November 21, when Mr. George Dring, M.A., B.Sc. (Developments Manager of Bakelite, Ltd.) delivered a lecture on "Some Chemical Aspects of Phenol-Formaldehyde Resins." The attendance was exceptionally large, about 150 being present. Mr. H. W. Rowell (chairman of the Section) presided.

The author said it is less than 25 years since the foundations of the phenol-formaldehyde synthetic resin industry were laid down by Dr. Baekeland, and since the war rapid advances had been made in the industry The success of the heat-hardening synthetic resins has given encouragement to the investigation of all types and kinds of resin-forming materials. Researches on new resins will continue to go forward, and it may be that some greatly improved materials will yet result We are rapidly getting to a position where it can be written down that such and such a combination of chemicals will show resin-forming characteristics, bu

only a limited number of these combinations will show commercial interest. Even a resin which gives a result of technical interest may be quite worthless commercially unless the price is attractive and unless the supply of raw materials is adequate and assured. The question of the supply of raw materials is one of very great importance to the synthetic resin industry, and in the case of phenol supplies it is doubtful whether the suppliers have yet generally realized the adjustments which must be made to cope with demands. The output of phenol-formaldehyde resin oils has far surpassed the output estimated four or five years ago, and it is now impossible to give an accurate estimate of possible expansion during another five years. Suppliers of phenol were asked to adjust their manufacture to keep pace with demand, and to supply the materials in such a state of purity and to such a rigid specification that their resources are temporarily strained almost to their limit. The position is not helped by the limited supplies of coal tar which are available to the coal tar industry, and it is further aggravated by the necessity of the coal-tar distillers to make up a balanced schedule of phenol, cresols, xylenols, and other products, so as to ensure the disposal of the whole of their supplies and not have large bulks of some one useless material left on their hands. To ensure that their ill-assorted team of products all keep pace with one another is undoubtedly a difficult task.

Efforts have been made to utilize the high phenolic content of low-temperature tars for use in the manufacture of phenol-formaldehyde resins, but so far with indifferent commercial success. Precise knowledge is needed of raw materials, this being as important as the synthesis of a pure crystalline product which can be analysed and given an accurate and scientific formula. It is for this reason that one appreciates the work of Prof. Morgan and his associates in trying to produce order out of chaos, and the work at Teddington to elucidate the nature of the complex bodies present in low-temperature tars is a step in the right direction. No satisfactory synthetic resin can be made by just taking crude raw materials and trusting to luck what happens to them. It has been said that this age may become known as the synthetic resin age, and it is obvious that with increasing uses for phenolic resinoids, phenols and substituted phenols will become more and more important as key materials. The phenols themselves are not free from considerable suspicion in regard to their chemical identity. The hydrogen joined to oxygen is both alcoholic and acidic, and it is suspected that it may migrate to the para position, and in some cases give a quininoid structure to the phenol. Some of the substituted phenols show a very awkward tendency to revert to ethers. Solubility in caustic soda is no criterion of true phenolic nature, as in some cases the insolubility of the sodium salt of the cresol in caustic soda complicates the problem, and in other cases, depending on the stability of the ether, an aryl or alkyl group attached to the oxygen may migrate into the benzyl nucleus under the action of caustic soda.

The fundamental work of Baekeland was carried out with natural phenol as the reacting material, and this has maintained its position at the head of the field of phenolic resins and synthetic resins, and if supplies of it become inadequate or fail, synthetic phenol can be produced in plenty, although to-day at much higher prices than the industry can afford. He believed it would be a paying enterprise to manufacture synthetic phenols, but so far there is no apparent evidence of a move in this direction in this country. As the price of phenol has heavily advanced, intensive research has been undertaken to produce from the other ingredients of coal-tar products equally as good as those made from phenol for special purposes. There is a prejudice against moulding materials from any other raw material than pure phenols. The cheap cresol moulding materials which were produced were of a one-stage type, which were very slow moulding, ejected from the mould in a flabby condition and often had a vile odour. Those old type of cresoled moulding powders bear no relationship to materials of present-day manufacture, because the resin reaction can be controlled. There will be still further advances in the technique of resin manufacture. A notable advance has been the production of phenol-formaldehyde resins which show a marked resistance to the action of caustic soda.

The author gave a presentation of the scheme proposed by Baekeland and Bender based on considerable experimental work on related compounds. One molecule of formaldehyde reacts with one molecule of phenol to give one molecule of phenoxy-methyl-alcohol (I); but this immediately rearranges in the case of phenol itself to hydroxy-benzyl-alcohol (II). It is suggested that this intermediate step is very important in connexion with the higher homologues of phenol.

The final step in the condensation where one formaldehyde group unites with one molecule of phenoxy-methyl-phenol cannot be proved, but various indications such as the formation of water and the phenolic properties of the product after condensation suggest that the tendency to polymerization is best explained by the formula where the double linkage between the carbon atoms gives a fruitful field for the theories of polymerization by primary valence linkage.

A knowledge of the colloidal behaviour of synthetic resins in their various polymerized forms holds the key to the behaviour of all the different synthetic resins which are made. The general considerations of colloidal structure links synthetic resins with closely related colloids such as rubber and cellulose, and much of the work which has been carried out on rubber and fibrous structures is of illuminating interest in the synthetic resin field. There can be no such thing as a true melting point of resinoid plastics: it is rather a question of the temperature of plastic flow, and the author gave a demonstration of temperature measurement by the method of H. E. Riley.

There was an interesting discussion in which Mr. H. W. Rowell, Mr. Megson, Dr. C. Chapman, Dr. Jordan, Mr. C. C. Last, Dr. Foster Sproxton, Mr. Newbound, and Mr. Potter took part.

EDINBURGH SECTION

A joint meeting of the Edinburgh Section of the Society with the local section of the Institute of Chemistry was held on Friday, November 24, in the

Pharmaceutical Hall, Edinburgh, with Mr. W. M. Ames in the chair. Mr. W. Bain read a paper on "Plastics and their Application to Friction Fabrics."

Vast quantities of resins and plastics are utilized to meet the world's requirements and the production of resins from natural sources for many reasons is uncertain. The supply of natural or fossil resins is by no means abundant, and it is possible that the supplies may become exhausted. In many of the old formula books mention is made of varnishes made from amber and other rare resins which to-day are sold at so much an ounce. With the passing of these raw materials, which were at one time abundant, the synthetic resins have come into their own, due to the labour of research chemists who have demonstrated that it is possible to equal and in many cases surpass the natural products.

Plastics are composed of a number of materials which when subjected to heat and pressure take a particular shape or form. Plastic materials may be made from: (1) Natural resins: (2) Cellulose products: (3) Casein obtained from milk; (4) Synthetic resins.

These materials when mixed with fillers and colouring material produce articles of great beauty and utility in all walks of life. The mixture of plastics and asbestos have been utilized in the fabrication of break linings for use in automobiles, trucks, and also for many industrial applications. In the early days of the motor industry futile recourse was had to such materials as hard rubber, cotton, leather, belting, and various woods: eventually metal to metal contacts were used. All these materials proved unsatisfactory, with disastrous results in many cases.

The salamander-like characteristics of asbestos had been known since Roman times, but had remained of more or less academic interest until the adoption of the steam engine during the middle of the last century. Since then rapid progress has been made in the scientific production of break linings. One of the most interesting processes in the production of motor-car components is the manufacture of break and clutch linings from the mined rock quarried in Quebec to the finished bonded friction fabric ready to apply to the motor-car.

The lecturer illustrated the method of preparing the rock through its various stages on suitable textile machines to the finished woven product.

After an interval in which questions were asked by members of the audience and answered by the lecturer, Mr. W. H. Wilkinson proposed a vote of thanks to Mr. Bain and this was received with applause.

FOOD GROUP

In connexion with the symposium arranged by the Food Group on November 23 and 24, a dinner was held at the Trocadero Restaurant, London, on Friday, November 24. Dr. L. H. Lampitt (the chairman of the Food Group) presided and among those present were Mr. Geoffrey Shakespeare (Parliamentary Secretary, Ministry of Health), Dr. J. T. Dunn (President of the Society of Chemical Industry), Sir F. Gowland Hopkins, P.R.S., Prof. W. W. Jameson, Dr. A. J. Kluyver, Dr. E. F. Armstrong, F.R.S., Prof. H. D. Kay, Dr. J. R. Katz, Dr. Holger Jørgensen, Prof. Max Samec, Prof. J. C. Drummond, Dr. J. Vargas Eyre, Dr. D. W. Kent-Jones, Mr. William Jago, Mr. W. A. S. Calder, Dr. R. T. Colgate, Dr. H. E. Cox, Dr. E. A. Fisher, Dr. L. H. Bundenberg de Jong, Sir Robert Robertson, F.R.S., Sir John Russell, Prof. H. Raistrick, Dr. C. W. Brabender, Sir Isidore Salmon, Dr. J. J. Fox, and many others who attended the symposium, the total company, including ladies, being about two hundred.

The toast of "His Majesty's Government" was proposed by the chairman who said that the Food Group was a very earnest body, among its objects being the bringing together of those who were interested in the scientific aspect of food, and especially to bring about contacts between scientists in the food industry and those working in the fields which abut on what the Food Group considered its own realm. Although it was felt that in this respect the Food Group had already done a great deal, it appeared, looking at the report which Sir George Newman's Committee had recently presented to the Government, that Sir George apparently had a very low opinion of chemists in industry. Although he might be interpreting Sir George Newman's opinion wrongly, it rather seemed that there were on the one side the medical officers of health marching forward with a white banner inscribed in red, "Purity," and on the other side there was apparently the chemist in industry, a diabolical figure poring over his test tubes and retorts and saying, with a diabolical grin, "Ah, I have found how to sophisticate food"! Although that might appear to be an exaggerated idea of Sir George Newman's appreciation of the chemists in food, personally he felt it was a very bad thing that the Press, which interpreted to the man in the street what these reports meant, should put that wrong interpretation on a report such as the one recently presented: but it had been done. Surely the essential object of chemists engaged in the food industry was exactly the same as that of the Ministry of Health, viz., to improve the food of the country, and undoubtedly they were backed up by the firms by whom they were employed. Obviously there would be some firms who would produce vitamin concentrates whether they were wanted or not. If a medical man said that snails' skins were good for carbuncles somebody would start producing snails' skins and it was really the medical man who was responsible for all these fads being put across. And that was carried a step farther because as soon as there were too many firms collecting snails' skins they would try and find if glow-worms' skins would do, and so the thing went on. This was but the normal course of events with a few people who were not really representative of our firms and business houses who employ chemists.

The Food Group had a new point of view, viz., the point of view of the chemist in the industry, who had to a large extent been disregarded in the past. Hitherto the interpreters of the food industry had been the public analysts or the medical officers of health, but in the Food Group there was now the possibility of the presentation of the scientific side through the medium of people who were actually working in the industry. In his view that was a very big step forward and chemists were extremely anxious to live up to the standards, first of all, of chemistry, and to study things from the chemical and scientific point of view.

The toast was coupled with the name of Mr. Geoffrey Shakespeare, Parliamentary Secretary to the Ministry of Health.

Mr Geoffrey Shakespeare in his reply welcomed the work being done by the Food Group of the Society, and referring to the Report of the Nutrition Committee appointed by the British Medical Association, said that a national newspaper had suggested that that report implied a doubt of the contention of the Ministry of Health that the distress and poverty brought about by unemployment had not resulted in malnutrition. There was, however, no such suggestion in the report of the British Medical Association. The conclusions arrived at on this matter by the Ministry of Health had been issued last October and none of them was questioned by the British Medical Association's Nutrition Committee. These conclusions of the Ministry were based on the official reports of medical officers of health in the depressed areas of the country, there being 74 investigators concerned with insurance medical practice in all parts of England and these investigators as the result of careful inquiries declared that in spite of local rises and falls in the incidence of sickness there is at present no available medical evidence of any general increase in sickness or mortality which could be traced to the effects of economic depression or unemployment. That, he contended, was a remarkable tribute to the steps taken by the National Government and the municipalities to maintain the health of the nation. Another striking feature to be noticed in regard to dietetics was the extraordinary improvement that had taken place not only in the quality of food but in the variety of food during the last generation, and that again was an important factor in the position that we had weathered the storm of general depression without impairment of the health of the nation. There was at the Ministry of Health an Advisory Committee consisting of eminent men which from time to time considered important aspects of nutrition and this Committee had issued two very interesting reports. The trouble was, however, that practical knowledge lagged behind scientific knowledge. For instance, everybody knew that to make milk pure, pasteurization was an excellent thing, but it was a very difficult matter to put that into practice. That was seen in the recent case at Manchester where the Corporation introduced a Bill containing provisions for the pasteurization of milk, but that Bill was rejected. There was thus a clash between the practical applicability and the scientific knowledge of chemistry. Speaking of the value of certain foods, Mr. Shakespeare said he understood that there are 1200 heat units in 1 lb. of herrings, in salmon 800 heat units to the lb., and in the oyster only 39, yet if he asked Dr. Lampitt to have a glass of stout and a dozen herrings he would undoubtedly refuse! That was another instance of the difficulty in applying scientific knowledge practically!

After all, concluded Mr. Shakespeare, the interests of the Ministry of Health and those engaged in the food industry were the same. They were both engaged in seeing that the very important question of nutrition and dietetics was so increasingly studied that the public could get more and more food on which it could rely, and the purity of which had been proved, and in that work the Food Group was playing, and would play, a very important part.

Dr. J. T. Dunn (President of the Society of Chemical Industry) proposed "Our Guests," and naming most of them, extended a warm welcome, at the same time expressing the wish that they would long prosper in the different walks of life in which they were so distinguished. The toast was coupled with the names of Prof. W. W. Jameson and Prof. Dr. A. J. Kluyver.

Prof. W. W. Jameson, M.D. (Dean of the School of Hygiene and Tropical Medicine) in the course of his response said that he had had a rather intimate acquaintance with those associated in daily work with chemists who had learned some of their work in industrial life and he was bound to say that with regard to some of the ordinary affairs of life he got more horse sense from the chemist who had had part of his training in industry than from anyone else. Perhaps that was why chemists as a whole had been so very successful when they devoted themselves to the business side of the profession. The formation of the Food Group inside the Society, therefore, would be one of the very best things the Society had ever done, because it would attract to the Society the interest of all sorts of people which it might otherwise have been difficult to do. Moreover, he believed the Ministry of Health would be grateful in time to the people who had had the courage to start this movement. Finally, Dr. Jameson said that having had experience of many different kinds of congresses, he congratulated the Food Group on the extraordinarily efficient manner in which the symposium had been organized.

Prof. Dr. A. J. Kluyver (Delft), who made the second response to the toast, after mentioning how chemists all over the world are fully aware of the very great services which the Society of Chemical Industry renders to the science of chemistry, added an expression of his own appreciation—and that of all the foreign guests—of the manner in which the Food Symposium had been organized and the hospitality that had been extended to them. In these times, he continued, when the exchange of foodstuffs between the various nations was the subject of so many restrictions and difficulties, it was very gratifying that the Committee of the Food Gronp had shown its desire to promote the free exchange of ideas between food scientists from all over the world. It was also gratifying that the British Government had given its hearty support to this attempt, in so far as, if he were not mistaken, the British Government had not imposed any import duties on food science, as it had done in the case of so many other things! He was still happier that the British Government had not imposed any export duties on food science because foreigners could now go home with a knowledge of the many things they had learned during the symposium from their British colleagues.

The speeches generally were short, and the enjoyment of the evening was added to by an excellent cabaret.

Finally, the chairman expressed special thanks to the Symposium Committee, of which Dr. D. W. Kent Jones was chairman and Dr. H. E. Cox honorary secretary, for the manner in which the symposium had

been organized, at the same time including the other members of the Committee and Mr. Pooley, the general secretary, for so efficiently carrying out the additional work which had fallen to them in this connexion.

GLASGOW SECTION

A joint meeting of the Glasgow Section with the Glasgow Section of the Institute of Chemistry was held in the Royal Technical College, Glasgow, on Friday, November 24. Prof. R. M. Caven occupied the chair and Dr. S. Horwood Tucker delivered a "Refresher Lecture on Organic Chemistry."

Dr. Tucker said that it was impossible in the course of one lecture to deal with all the outstanding advances which had been made in organic chemistry in the last few years. He had therefore selected what to him seemed most important, but fully realized that he had omitted many subjects of equal importance. He then dealt with the application to organic chemistry of the electronic conception of valency. He outlined the views of Kossel and Lewis and elucidated in a very clear manner the semi-polar bond or, as he preferred to call it, following Sidgwick, the co-ordinate covalent link. Typical organic groups such as nitroso and nitro were considered in the light of the electronic theory and then the lecturer passed on to the tetrahedral structure for sulphur and nitrogen. He showed that only by assuming this structure could the optical activity of 4-phenyl-4'-carbethoxy-bispiperidinium 1-1'-spiran bromide be explained. This led to chelate compounds, which Dr. Tucker described as ring compounds in which one of the bonds was a co-ordinate covalency. The latest views on the isomerism of oximes was explained and it was shown how, in the Beckmann transformation, it had been proved that it was the trans groups, not the cis, which changed places. By means of carbon models Dr. Tucker showed how it was possible to build up large rings containing large numbers of carbon atoms without having any centres of strain and also demonstrated in a very clear way the "obstruction" theory for optical activity in the diphenyl series. The recent work of the two Schlencks, father and son, on the Grignard reaction was mentioned and then the lecturer proceeded to consider the advances in the structure of the sugars. In this section Dr. Tucker said there was much of interest but he could only refer to the new formula for glucose suggested by Haworth. He then proceeded to consider the proteins. The work of Fischer in this field was well known, said the lecturer, but while Fischer had suggested that the proteins might be built up of long chains of amino acids he had been sufficiently far-sighted to suggest that there might be other types of grouping present. The possibility of there being a ring structure in proteins has been put forward and Troensegaard has attempted to correlate proteins with the porphyrin ring systems in chlorophyll and hæmin. This theory, however, is difficult to apply biologically. In the section dealing with the alkaloids, Dr. Tucker said that it had been suggested that alkaloids arose from proteins and amino acids and a biogenic mechanism for the iso-quinoline group had been proposed by Winterstein and Trier. Alkaloids had now been synthesized by Robinson under conditions which might occur in the plant.

In conclusion, Dr. Tucker dealt with vitamins, hormones, and carcinogenic substances. The precursor of vitamin-*A* is carotin, the colouring matter of carrots, which undergoes transformation into vitamin *A* in the liver. The information about vitamin-*B* is not so definite, but Windaus claims to have isolated it and strangely enough found it to contain sulphur. Even more interesting than the other two is vitamin-*C*, the antiscorbutic vitamin which occurs in fresh fruit, vegetables and the adrenal cortex. It is known to be present in oranges and lemons but attempts to isolate it from this source have, so far, been unsuccessful. It has, however, been obtained comparatively easily and in good quantity from Hungarian red pepper. Vitamin-*D* is the antirachitic vitamin and its precursor has been shown to be ergosterol. In dealing with the hormones, Dr. Tucker said that several of these had been isolated and recently a substance has been prepared which possesses in a modified degree the properties of the sex hormone, œstrin. Among the cancer-producing substances Dr. Tucker said that it had now been definitely established that 1 . 2-benzpyrene had carcinogenic properties.

A vote of thanks to the lecturer was proposed by Prof. W. M. Cumming and seconded by Mr. Middleton.

YORKSHIRE SECTION

A joint meeting of the Yorkshire Section of the Society with the Huddersfield Section of the Institute of Chemistry was held at the Huddersfield Technical College on Tuesday evening, November 21, when, before a large audience which included members of the Huddersfield Engineering Society, Major F. A. Freeth, O.B.E., F.R.S., joint research manager of Imperial Chemical Industries, Ltd., delivered a lecture on "Drikold." After considering the critical state, and the principles involved in the liquefaction of gases, Major Freeth discussed the manufacture and technical applications of solid carbon dioxide.

CHEMICAL SOCIETY

An ordinary scientific meeting of the Chemical Society was held on Friday, November 24, in the Lecture Theatre of the Tatem Laboratories, University College of South Wales and Monmouthshire, Cardiff. The chair was taken by the President, Prof. G. T. Morgan, F.R.S. A discussion on "Chemical Applications of Optical and Morphological Crystallography" was opened by Prof. G. M. Bennett and Dr. N. H. Hartshorne, and contributions to the discussion were made by Dr. Mary W. Porter, Mr. E. G. Cox, Mr. F. M. Lea, Dr. N. M. Cullinane, Mr. A. Stuart, Mr. R. G. Wood, and Mr E. S. Davies.

Applications of Optical Crystallography in Chemical Practice. [N. H. Hartshorne.]

In many chemical problems which need the aid of crystallography, optical and morphological methods are more suitable than the *X*-ray method, because they give all the information required more simply and directly. Such problems are chiefly of the kind in

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which crystallographic data are needed for the main purpose of identifying and characterising substances. *Further, these methods are not so time-consuming and* expensive as to make it impracticable for the average chemist to use them himself.

By means of the polarising microscope, characteristic optical data may be obtained directly on crystalline specimens varying widely as regards state of division, purity, admixture with other substances, and other *features of form and environment. The chemical uses* of this method of examining crystals may be stated briefly as follows: (i) It often forms a useful preliminary to the analysis of solid material, since it may indicate whether the material is homogeneous or heterogeneous, whether impurities are present etc. and may suggest the best way of carrying out the analysis. (ii) It can frequently be used to identify and characterise solid compounds in cases where ordinary analytical and physical methods fail or are tedious, or where confirmation of the results obtained by these methods seems desirable. Examples under this heading are the identification of salts in salt mixtures (chemical analysis giving only the ions), the identification of solid phases in phase-equilibrium studies, the differentiation of isomerides having indefinite melting points, and the control of fractional crystallisations and trial syntheses. (iii) It affords a ready means of obtaining definite characteristic data with which to describe crystals of new compounds for record purposes.

The principles underlying the determination of the more important optical characters of crystals were dealt with in brief, and the methods of attack suitable for different kinds of problem were discussed.

Applications of Morphological Crystallography in Chemical Research. [G. M. Bennett.]

Apart from the more fundamental information which may be obtainable by means of the *X*-ray investigation *of a crystal, the examination of substances from the* crystallographic point of view by means of the microscope and goniometer is a valuable auxiliary in chemical research. The chemist may make an approximate investigation under the microscope (the precision of which may, however, be strengthened by the use of optical methods: see preceding paper), or he may use *the goniometer and obtain a complete crystallographic* description of the substance examined.

Any chemical substance, not belonging to the cubic system, has a unique crystal form which may be made the basis of a method of absolute identification of, or discrimination between, specimens, independently of analytical or any other criteria.

The special circumstances in which such a practical method may become of particular importance were discussed—for instance, where the amount of available material is extremely small (as in biochemical work) or where other standard criteria, such as melting-point data, fail or are uncertain. A number of cases were described, including identification of biochemical products, proof that two substances formerly regarded as isomeric are identical (alkali ferrocyanides), and the proof that two substances of identical composition are not chemically identical but isomeric (stereoisomeric *disulphoxides of dithian, and oxides of penthianols).*

The problem of complete identification by "crystallo-chemical" analysis was discussed. This involves the combination of complete goniometric examination with some standardised method of "setting" the crystal in computing the elements, and a systematically arranged reference list. The methods of classification and tabulation of data devised by Fedorov and by T. V. Barker and the demonstrations of the success of their methods in practice were mentioned.

The disadvantages of the crystallographic method were considered.

The Use of Optical Crystallographic Methods in Phase Equilibrium Studies. [F. M. Lea.]

Modern methods of microscopic technique permit of the determination of the refractive indices of small crystals, or powdered solids, to within 0·001 unit by the use of suitable immersion methods. Other characteristic optical properties can also be determined. The characteristics of compounds can thus be described in definite terms in place of a vague description of the outward habit.

Such methods have formed an essential part in investigations of phase equilibrium at high temperatures in systems of various oxides of high melting point. Their value and application to the study of aqueous systems has been insufficiently appreciated. The *systematic measurement of optical properties affords* a valuable check on analytical results even in the simplest systems. In complex aqueous systems, and in systems in which equilibrium can only be attained very slowly, the use of such methods seems essential to the complete and correct interpretation of the phase relationships. The basic ferric sulphates, the hydrated calcium aluminates, and the dehydration products of gypsum were discussed as examples.

Investigation of Some Organic Compounds Existing in Forms of Different Colours. [N. M. Cullinane, A. Stuart, and R. G. Wood.]

A number of organic substances are known which have been obtained in differently coloured forms. This phenomenon has been called by Hantzsch "chromoisomerism." The proof that these modifications are different is frequently lacking, and there is no doubt *that they are in some cases identical except in colour,* this variation being due to impurity, the stage of aggregation, and the like.

In the work under review a number of derivatives of diphenylamine have been isolated in yellow and red varieties. Physico-chemical tests were used to demonstate their identity or otherwise, and in addition, *X*-ray analysis, goniometrical measurements where possible, and optical examination under the microscope were variously used to confirm the results. Studies of the substances picrylaniline, 2 : 4-dinitro-2′-methoxydiphenylamine, 2 : 4-dinitro-2′-methoxy-5-methyldiphenylamine, and 2 : 4-dinitro-4′-methoxy-5-methyldiphenylamine were described.

These studies demonstrate that the optical method especially is, in certain cases, more delicate and certainly more rapid than physico-chemical tests, and provides a very useful check on the homogeneity of the material *being investigated. The latter point is illustrated by*

the case of 2 : 4-dinitro-5 : 4′-dimethyldiphenylamine, of which two sets of crystals from different solvents, though both yellow in colour, were observed to be different in optical properties.

Optical Properties of Crystals and Molecular Structure. [E. G. Cox.]

O. Wiener in 1912 showed quantitatively that if a substance consists of isotropic particles, small compared with the wave-length of light, dispersed in an isotropic medium of different refractive index, then double refraction arises, the nature of which depends on the shape of the particles but not on their size. The most interesting cases arise when the particles are arranged in some regular manner, and when their form differs appreciably from the spherical. Thus rod-like or plate-like particles arranged parallel to an axis give a positive uniaxial medium, while rods or plates arranged perpendicular to an axis result in a negative uniaxial medium; in each case the axis is also the optic axis.

In recent years these considerations have been applied to crystals; for example, W. A. Wooster has collected and discussed the optical data for a number of inorganic substances for which the crystal structure is known, and has reached empirically conclusions similar to those derived from Wiener's theory. It is clear that two factors combine to give the observed optical properties, viz., the form of the molecules and their arrangement in the crystal structure, and that in many cases the two are inseparable. However, in the case of complex inorganic ions and organic molecules it is frequently possible to gain information about their form without going deeply into the question of crystal structure. In particular, in the case of organic substances for which several structures may be proposed, it is often possible to exclude certain of them as a result of the optical examination of the crystals. Examples of this are calciferol and various hormones studied by Bernal, ascorbic acid, and cyanuric azide. It should, however, he stated that full use of these investigations can only be made in conjunction with other methods, *e.g.*, *X*-ray examination. In some cases the investigation of the optical properties affords a relatively simple method of obtaining more precise information regarding molecular or ionic structures where the *X*-ray method is difficult or uncertain in application beyond a certain point. Thus when a complex ion consists (as frequently happens) of a heavy metal atom surrounded by much lighter ones, it is a matter of some difficulty to determine the positions of the latter by *X*-ray analysis, whereas an examination of the refractivities of the crystal in different directions may assist considerably towards settling the question.

The above applications are largely of a qualitative nature, but the beginnings of quantitative treatment have been made (W. L. Bragg's calculation of the refractive indices of calcite and aragonite were made as early as 1924). From the known refractivities of the atoms the refractivity of a (not too complicated) molecule *in different directions* can be calculated, so that if the molecular arrangement in the crystal is known, the refractive indices of the crystal can be obtained. Thus, in a case where there may be alternatives for the form of the molecule, the refractive indices can be calculated for each, and the correct form found by comparison with observed optical properties. It may not be necessary in such a case to know the precise relative orientation of the molecules in the crystal; further information on this point may indeed emerge during the comparison of the theoretical and observed indices. Some calculations were given as examples of this method.

The Barker Method of Crystallo-chemical Analysis. [Mary W. Porter.]

The number of chemical substances that have been measured on the reflecting goniometer exceeds 8000, and the greater part of the measurements are to be found in Groth's "Chemische Krystallographie," where they are arranged according to the chemical composition of the substances. It has not been possible in the past to base an arrangement on crystal angles (or constants derived from them) because there is a wide choice in the selection of axial directions, and for each set of axial directions there will be a different set of crystal constants, and different characteristic angles.

What is required is a set of rules which will ensure that two independent workers after measuring the same crystal will choose the same axial directions and obtain the same characteristic constants, which can be used as a basis of classification in the formation of an index.

Fedorov devised a method, based on his views of crystal structure and his great index "Das Krystallreich," produced with the help of his pupils, of whom T. V. Barker was one, contains a list of all crystals then measured, by which any substance could be identified from a measurement of its angles. This work, however, never came into general use, owing to the complicated nature of the method and the laborious calculations required.

In the course of some fifteen years Barker, stimulated by the work of Fedorov, evolved a simpler method, in which all considerations of structure were omitted, and gave simple rules by which an index of crystals might be constructed. This method has been tried by a number of crystallographers in this country and abroad, and has been found simple and workable. The method was briefly discussed.

The Identification of Some Aromatic Nitro-compounds by Optical Crystallographic Methods. [E. S. Davies and N. H. Hartshorne.]

By means of the polarising microscope, the optical properties of crystals of the following disubstituted nitro-compounds have been studied: *o*-, *m*-, and *p*-nitrophenols, nitrobenzaldehydes, nitrobenzoic acids, chloronitrobenzenes, bromonitrobenzenes; *m*- and *p*-nitroanilines; *o*- and *p*-nitrobenzyl alcohols; *p*-nitrotoluene. In all cases, crystals grown from at least two different solvents were examined, but very little influence of solvent upon crystal habit was observed. Every substance showed one or two characteristic optical sections when its crystals were mounted in the ordinary way on a microscope slide, and the substances could be differentiated and identified by these sections alone, both in single specimens and in mixtures containing two or three of the compounds. The mixtures were prepared by an independent third party.

INSTITUTE OF CHEMISTRY

After the annual general meeting of the Leeds Area Section of the Institute of Chemistry held in the New Chemistry Lecture Theatre of the University of Leeds on Monday, November 20, Dr. Samuel Glasstone of Sheffield University gave a lecture, a summary of which follows, on "Electrometric Methods in Physical and Analytical Chemistry."

Electrometric methods may be conveniently divided into two sections, namely, conductometric and potentiometric. Determinations of conductivity have played an important part in the development of the modern theory of electrolytes, and have also been used to study the hydrolysis of salts, the solubility of sparingly soluble salts, the ionic product of water, and the dissociation constants of acids and bases. Apart from matters of theoretical interest, conductometric methods have found application in analytical work: the neutralization of strong and weak acids (alone and in mixtures), the displacement of a weak acid from its salt by a strong acid, and the precipitation of insoluble salts may be followed by conductometric titration. The chief development in the technique of conductivity measurement concerns the use of the thermionic valve as a source of symmetrical A.C., and various methods for its rectification, so as to permit the use of direct-current instruments as detectors and simplification of the apparatus for conductometric titration.

By measuring the E.M.Fs. of suitable cells it is possible to determine the transport numbers of ions, the valency of ions, and the heats of certain reactions with considerable accuracy. The study of single electrode potentials is important for the determination of p_H: for this purpose various electrodes, *e.g.*, hydrogen, oxygen, air, antimony, quinhydrone, and glass have been used. The amplifying properties of the thermionic valve have been applied, both with and without a potentiometer, to measure E.M.Fs. of high and low resistance cells, particularly for purposes of potentiometric titration.

A potentiometric method of a quite different type is that involving the "dropping mercury cathode": the apparatus, known as a "polarograph" is of the automatic self-registering type, and by means of it solutions containing as little as 10^{-5} g. mol. per litre of any ion or reducible substance may be analysed. The apparatus has also been used in connexion with fundamental physical problems, such as over voltage, electrolytic reduction, and the stability of complex ions.

INSTITUTION OF CHEMICAL ENGINEERS

The annual reception of the Institution of Chemical Engineers is now a well-established event in the activities of scientific organizations, and by the pleasant opportunity which it affords for a reunion of old friends and colleagues it is an event which makes November a notable month for all chemical engineers. This year's reception was no less pleasant than those of previous years, and a large number of guests were received at the Waldorf Hotel, London, by the President of the Institution, Viscount Leverhulme, and Viscountess Leverhul Amongst those who had accepted invitations were :—

Sir Robert and Lady Hadfield, Sir Hugo and La Hirst Sir Richard and Lady Gregory, Sir Frank a Lady Heath, Sir Henry Maybury, Sir Frank Smith a Miss B. Smith, Sir Robert and Lady Robertson, William and Lady Alexander, Sir Joseph Petavel, Pr Sir James and Lady Henderson, Sir Francis and La Goodenough, Sir Ernest and Lady Graham-Little, Christopher and Lady Clayton, Prof. Sir Frederi Hobday, Prof. and Mrs. E. N. da C. Andrade, Dr. an Mrs. E. F. Armstrong, Prof. H. E. Armstrong and Mi Armstrong, Mr. J. A. Attenborough and Miss M. Attenborough, Mr. and Mrs. Horatio Ballantyne, Pr E. C. C. Baly, Dr. and Mrs. G. Bengough, Prof. a Mrs. V. H. Blackman, Prof. W. A. Bone and Miss Bon Prof. and Mrs. J. S. S. Brame, Col. and Mrs. E. Brigg Prof. and Mrs. H. V. A. Briscoe, Dr. and Mrs. F. H. Ca Mr. Alan Chorlton, M.P., and Miss Chorlton, Pr R. G. H. Clements, Dr. and Mrs. R. T. Colgate, Pr and Mrs. J. A. Crowther, Dr. and Mrs. W. Culle Prof. and Mrs. C. H. Desch, Dr. and Mrs. J. T. Dun Dr. and Mrs. A. E. Dunstan, Dr. H. J. T. Ellinghar Dr. J. Vargas Eyre, Prof. and Mrs. L. N. G. Filo Prof. and Mrs. G. I. Finch, Prof. and Mrs. A. Fowle Dr. and Mrs. J. J. Fox, Prof. and Mrs. W. E. Gibb Dr. and Mrs. H. Gough, Dr. and Mrs. R. Lessing, Dr. a Mrs. H. Levinstein, Dr. and Mrs. S. Miall, Mr. E. Mon Dr. and Mrs. H. Moore, Prof. and Mrs. G. T. Morga Dr. and Mrs. W. R. Ormandy, Dr. and Mrs. R. Pickard, Mr. and Mrs. H. J. Pooley, Mr. and Mrs. Davidson Pratt, Prof. and Mrs. H. Raistrick, Prof. a Mrs. A. O. Rankine, Mr. and Mrs. E. Reavell, Mr. a Mrs. J. Arthur Reavell, Dr. and Mrs. R. Seligman, Dr. a Mrs. F. S. Sinnatt, Dr. E. W. Smith, Dr. S. W. Smit Prof. and Mrs. J. F. Thorpe, Mr. and Mrs. H. T. Tizar and Prof. and Mrs. S. G. M. Ure.

CORRESPONDENCE

LYCOPIN

SIR,—The following curious fact has recently come my notice. An unripe tomato was cut in half perpend cular to the stem, the two halves placed close to ea other, and the whole left to ripen. After about a we the upper half, containing the stalk end, had ripen to a good red colour, while the lower half remain its original green. The tomato was frequently move so there could be no question of light falling uneven on the two sides. It appears as if the substance—enzym hormone, or whatever it is—responsible for lycop formation must be produced at the stalk end. I ha been unable to repeat the experiment owing to t absence of suitable conditions for ripening, and shou be interested if any of your readers could throw lig on any of the chemical or physiological process involved.

I am, Sir, etc.,

S. MUSGRAVE

London, N.W.8

Nov. 11, 1933

PERSONAL AND OTHER ITEMS

Mr. W. T. Astbury, lecturer in textile physics in the University of Leeds, has been awarded a medal by the University of Lille in recognition of valuable investigations he is carrying out by means of X-rays into the structure of animal fibres.

Prof. H. S. Raper, Brakenbury Professor of Physiology in the University of Manchester, has been appointed a member of the Medical Research Council to take the place of Prof. E. Mellanby, who resigned recently on accepting the appointment of secretary to the Council. Prof. Raper held appointments in the Universities of Toronto and Leeds before taking up his present post in 1923. He has published many papers on physiological and biochemical subjects.

The Australian Chemical Institute has awarded the H. G. Smith medal to Dr. I. W. Wark. The medal is presented to the research worker who, in the opinion of the Institute's Council, has contributed the most valuable additions to chemical science in Australia in the last ten years. Dr. Wark has carried out much work on flotation, electrodeposition of zinc, and metallic complexes with hydroxy-acids.

The University of Manchester has appointed the following honorary research fellows for the session 1933—34: Mr. E. L. Francis of Manchester (in metallurgy), Dr. C. A. Kerr of Glasgow (in organic chemistry), and Dr. Juro Horiuti of Tokio (in physical chemistry).

British Standards Institution

The British Standards Institution has recently issued four new specifications prepared by a technical committee of the Chemical Divisional Council, on which the Society is represented, dealing with methyl alcohol, ethyl alcohol, normal butyl alcohol, and acetone (Nos. 506, 507, 508, 509—1933, respectively). The specifications deal concisely with specific gravity, distillation range, miscibility with water, residues on evaporation, flash points, and with aldehyde contents when dealing with the alcohols. The methyl alcohol specification also includes a test for sulphur and sulphur compounds, and the appendices in the specifications describe very clearly the methods of making tests and the apparatus to be employed. The specification for acetone includes determinations of alkalinity and alcoholic impurities, and the permanganate test. The details of the tests adopted have been arrived at as the result of much careful criticism of the available methods of analysis, particularly from the point of view of degree of accuracy and reliability, and much experimental work has been carried out by members of the committee in the practical verification of these methods. In fixing the limits, there has been close consultation and discussion between the principal users and manufacturers of the articles dealt with in the specifications. Each of the specifications is simple and concise and will no doubt be welcomed by manufacturers. They may be obtained, price 2s. 2d. each post free from the British Standards Institution, Publications Department, 28 Victoria Street, London, S.W.1. These specifications are the first to be issued by the committee which has been working for the past year under the chairmanship of Dr. J. Vargas Eyre to prepare a comprehensive series of nationally agreed standards for solvents. Other specifications are nearing completion for acetic acids, ether, acetates, phthalates, diacetone alcohol, hexachlorethane, etc.

B.I.F. Publicity

Members of Dominion Newspapers, an organization embracing most of the important newspapers and periodicals in the British Dominions and Colonies, at a meeting in London recently strongly criticized the publicity arrangements for next year's British Industries Fair. It was urged that as the development of export trade was of paramount importance, the policy of postponing adequate advertisement of the Exhibition until such time as its revenue should have increased was unsound, detrimental both to commercial progress and the prestige of the Fair.

Of interest to manufacturers also is a resolution passed at the meeting condemning "the undue reliance placed by the Board of Trade upon lists of selected possible buyers for postal circularization in the British Empire overseas, where the communities as a whole should be informed of the Exhibition's national scope and purposes."

Industrial Bursaries

The Company of Armourers and Brasiers in the City of London grant senior bursaries to British subjects, under the age of 24, who have completed a three years' course in engineering, metallurgy, mining, or electricity at a school in London approved by the Company, and who have obtained the degree with honours of B.Sc. (eng.) (mining) or (metallurgy) at the University of London. Full particulars and application forms may be obtained from The Clerk, The Company of Armourers and Brasiers, Armourers' Hall, 81, Coleman Street, E.C.2, to whom also applications for next year's bursaries must be sent before May 31.

Alleged Dyestuff Dermatitis

In the High Court of Justice recently Mr. Justice Goddard awarded a total of £172 11s. damages to a plaintiff, Mrs. Barbara Wills, who claimed damages from Bentalls, Ltd., Kingston, for alleged breach of warrant, on the sale of fur trimming from which she was stated to have contracted dermatitis. The trimming was of dyed wool and contained no fur. The defendants in the action delivered a statement of claim against the wholesalers, Debenhams, Ltd., for indemnification if held liable to the plaintiff. Debenhams, Ltd. similarly claimed indemnity from Astrachans, Ltd. the manufacturers: Astrachans, Ltd. from the dyers Smithson-Gledhill, Ltd.: and this firm in turn from Imperial Chemical Industries, Ltd., manufacturers of the dye.

Evidence as to the dyeing processes was given by Dr. C. J. J. Fox, and Mr. Adolf Jaffé gave evidence of analyses of the trimming, which showed no toxic substance. Dr. O'Donovan, dermatologist, gave evidence of his diagnosis of dye dermatitis and of negative results obtained in tests for idiosyncracy of the plaintiff. Whilst accepting the results of analyses, he gave the opinion that the irritation might have been caused

by excess of dye at one point and insufficient clearance at that point, as the dermatitis began with a small patch and not a general outbreak. Dr. T. E. Thomas, chief medical officer of Imperial Chemical Industries, Ltd., agreed with the diagnosis of dermatitis but not of dye dermatitis. In giving judgment Mr. Justice Goddard said that whilst he thought the trimming had caused the plaintiff's illness, it was an unlucky accident, and did not mean that any of the parties was normally or commercially to blame for supplying it.

Indemnity was admitted up to the fourth party and judgment was given accordingly. Judgment was also entered for Astrachans, Ltd. against the fifth party, Smithson-Gledhill, Ltd., but the issue between Smithson-Gledhill, Ltd. and Imperial Chemical Industries Ltd., remains to be tried.

Catalyzed Reaction of Hydrogen with Water

In a letter to *Nature* of November 25, Prof. M. Polanyi and Dr. J. Horiuti state that, following the observation recently made by Mr. L. Oliphant that when hydrogen is kept in contact with water for a few months an exchange of atoms occurs between the hydrogen and the water, they have now found that the reaction can be catalysed by platinum black such as that used in hydrogenation. A quantity of platinum black, produced by reduction of platinum chloride with formaldehyde, was added to a quartz vessel containing a 1·1-*N* solution of sulphuric acid in water, and hydrogen containing 1·08% of deuteronium, the heavy isotope of hydrogen. After shaking for an hour at room temperature it was found that the deuteronium content had fallen by 0·66%. It is suggested that the catalytic exchange of atoms between hydrogen and water, caused by platinum black, is due to the ionization of hydrogen corresponding to the electromotive process of the hydrogen electrode. When the hydrogen contains deuteronium, this heavy isotope is replaced by hydrogen. The slow atomic exchange previously observed may be due to a hidden catalyst acting in a similar way. It is possible that the walls of a vessel may act as a weak ionizing agent, since it is known that glass can form a hydrogen electrode.

Industrial Production

Industrial production in the third quarter of 1933 is estimated by the Board of Trade to have been at about the same level as in the previous quarter and 10·6% better than in the third quarter of 1932, the index figure, based on the quarterly average of 1924 equal to 100, being 96·7. A notable improvement was shown in the iron and steel manufacturing industries, the index number being 84·2, as compared with 61·5 for the same quarter last year. The index for the chemical and allied trades was 95·3 as compared with 101·3 in the previous quarter and 92·5 the same time last year.

"Q" Special Company, R.E.

The many chemists who served during the war in "Q" Special Company, Royal Engineers, will be interested to learn that the 12th annual reunion and dinner of the company will be held at Anderton's Hotel, Fleet Street, London, E.C.4, on Saturday, January 6, 1934. Particulars may be obtained from H. T. Islip, "Wayside," Iver, Bucks.

Association of Technologists of the River Plate

The third ordinary meeting was held at the English Club, Buenos Aires, on September 12, when a paper was read by Mr. James Ford, on "Sulphuric Acid, its History, Manufacture, and Uses."

Tracing the history of sulphuric acid from earliest times, he led up to modern manufacturing methods giving a critical comparison of the lead chamber and contact systems of production, and gave interesting data obtained from experiments conducted in the Argentine camp on the application of sulphuric acid to the spraying of crops in order to destroy weeds and so increase yields per acre of crops.

On October 7 members of the Association inspected the super power-station of the Italo-Argentina S.A., and on October 21 a visit was paid to the petroleum refinery of the Diadema-Argentina Ltda.

Canadian Mining

According to the Dominion Bureau of Statistics at Ottawa, 42 coke and gas plants were in operation last year in Canada, the value of products aggregating $29,812,650, a decline of 5%. The output of gas-house, by-product, and beehive coke totalled 1,637,701 tons as compared with 1,832,700 t. a year previously.

Salt production in Canada in 1932 amounted to 263,543 short tons, valued at $1,947,551, which is about the same as production last year. The Neepawa Salt Co. reported commercial production for the first time in Manitoba, and operations were continued in Nova Scotia and Ontario.

British Association of Chemists

At the annual meeting of the British Association of Chemists held at Manchester on November 25, a resolution was passed empowering the Council of the Association to elect as Fellows eminent persons interested in the objects of the Association. Another resolution enables the Council to elect as Associates chemists not of British nationality, for the duration of their stay in this country.

Wenborn's Scientific Supplies

In the Special Laboratory Supplement of November 17, p. S 34, col. 1, the name of the first firm should read "Wenhorn's Scientific Supplies." The first paragraph under this heading should state that laboratory requirements made of Jena glass are obtainable from this company, who hold large stocks. Wenborn's Scientific Supplies are not the specially-appointed agents of Schott & Gen. as might be inferred from the article.

Erratum

In the Transactions of November 24, 1933, p. 374 T, line 3, for "A. D. Orla-Jensen" read "S. Orla-Jensen."

REVIEWS

TRO-CELLULOSE LACQUER MANUFACTURE. By R. G. Daniels, B.Sc. Edited by T. Hedley Barry. Pp. xiii + 133. London: L. Hill, Ltd., 1933. 10s.

If Mr. Daniels has a ruling passion it is nitrocellulose quer, and his knowledge of the subject is on the grand ale. He has now set down in print the fundamentals the art of manufacture from the view-point of the actical man, and as such the book will be generally elcomed by technologists working in this field. The ook is not a catalogue of other people's views: there e no detailed formulæ, only type examples, and though the properties of component materials are scribed more or less after the usual manner, these apters are relieved by the sound comment of the an who really knows. The later chapters on Recording Information, Factory Organization, Buildings and lant are most valuable and will give the book a perianent place in the literature, whilst the short (too short) hapter on Faults and Their Correction provides a elcome refuge for harassed works' chemists in time f trouble. L. A. J.

ANNIN, CELLULOSE, LIGNIN. By Dr. K. Freudenberg. Serving also as the 2nd edition of "Chemie der Natürlichen Gerbstoffe." Pp. iv + 165. Berlin: J. Springer, 1933. 8.80 rm.

This monograph, which is also to serve as the second dition of the author's "Chemie der Natürlichen Gerbstoffe," contains more than its title indicates.

Besides an account of the present state of these three ields in which he has worked, Freudenberg also includes his work on related subjects, such as the syntheses of simpler sugars and disaccharides, and his researches in which Werner Kuhn in part collaborated on the relation of optical rotation to stereochemical configuration. The book is therefore of considerable personal interest.

Freudenberg's work on tannins, begun with Emil Fischer, and his work on lignin, has contributed much in the development of modern ideas on the structure of natural polymers and to the understanding of the morphology of wood. These substances which are heterogeneous do not conform to the old criteria for chemical individuality and special methods for their study had to be devised. The study of the kinetics of breakdown of cellulose and starch, and of their optical properties, has been important in the establishment of their chain structure.

A debt is owed to Freudenberg also for bridging the gap between the modern physical picture of the causes of optical activity and the old empirical rules which often have been valuable for establishing structure. K. F. A.

REZEPT-TASCHENBUCH FÜR DIE LACKINDUSTRIE. By H. Hadert. Pp. 482. Berlin: O. Elsner, Verlagsges., 1933. 40 rm.

The list of topics covered by the recipes is comprehensive, including leather and rubber preparations, water glass, casein products as well as typical oil and spirit varnishes, cellulose lacquers, and enamels. The arrangement of the material is unsystematic. There is no author index and there are no references to original papers. In a small percentage of cases formulæ are taken from patents, the number of which is given. In others the recipe is ascribed to an author whose name is given, but it is impossible to follow up the matter further owing to the absence of a reference: *e.g.*, on page 267, nitro-cellulose—Schleiflack-Grundierung (Englisches Rezept und nach Bianchi-Weihe). The table of contents is to be found on p. 453, before the subject index, and not at the beginning of the book. From pages 277–442 there are tables with a brief description of analytical methods and many useful characteristics of pigments and media. This part of the book is valuable, but the absence of reference is a great mistake.

The book is small (7 × 5 × 1½) and very expensive (40 m.). It is difficult to recommend it to an ordinary reader, although it might be very useful in a works' laboratory. The author in his preface pleads for lenient treatment from his readers, because of the great difficulties in collating the material. It must be admitted that the author has made a valiant attempt to present recipes of a modern character. No doubt if the book gets to a second edition its defects will disappear, because it contains much valuable information. R. S. MORRELL

COMPANY NEWS

BRITISH CYANIDES CO., LTD.

The accounts of the company for the year ended June 30 show a net profit of £12,724, as compared with £9321 for 1931–32. After provision of preference dividend and interim dividend of 3% paid in February last there remains a balance of £7573, out of which £5000 is to be placed to reserve and £2573 carried forward. The report states that progress was made during the year, and Beetle moulding powders and Beetleware have increased in popularity. Since the close of the financial year securities held by the company have been realized to the extent of £18,230 and the net profits earned during the first quarter have exceeded the sum required to pay an interim dividend of 4% less tax, on the ordinary shares.

The report refers to the arrangement recently concluded with Pollopas, Ltd., whereby the Pollopas patents for certain Continental countries and for the British Empire with the exception of Canada, have been purchased. As part consideration for the purchase the company has transferred to Pollopas, Ltd., its interest in Synthetic Plastics, Co. in America.

Reference is also made to a new lacquer resin developed in the company's laboratories, and for which special plant for manufacture is to be installed at Oldbury. All the patents of I.G. Farbenindustrie A.-G. on lacquers and lacquer resins of the urea type have been acquired for England, and the manufacture of the Plastopol resins made by the I.G. will in due course be undertaken at Oldbury, together with that of any new lacquer resins of the urea type that may be discovered.

LANGDALE'S CHEMICAL MANURE CO., LTD.

The report of the company for the year ended September 30, 1933, shows a profit of £53, reducing the debit brought forward to £235. A statement was submitted at the annual meeting on November 30 regarding the future arrangements of the company's resources.

MARKET REPORT

This Market Report is compiled from special information received from the manufacturers concerned.

Unless otherwise stated, the prices quoted below cover fair quantities net and naked at sellers' works.

GENERAL HEAVY CHEMICALS

Acid, Acetic, 40% tech.—£20 5s. per ton d/d address U.K. in casks.

Acid, Chromic.—10½d. per lb., less 2½% d/d U.K.

Acid, Hydrochloric.—Spot, 4s.—6s. per carboy d/d according to purity, strength, and locality.

Acid, Nitric 80° Tw. Spot, £18–£25 per ton makers' works, according to district and quality.

Acid, Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia (Anhydrous).—Spot, 10d. per lb. d/d in cylinders.

Ammonium Bichromate. 8d. per lb., d/d U.K.

Bisulphite of Lime £6 10s. per ton, f.o.r. London, packages free.

Bleaching Powder, 35/37%.—Spot, £8 15s. per ton d/d station in casks, special terms for contracts.

Borax, Commercial. Granulated, £15 10s. per ton; Powder, £17 per ton. (For 1-ton lots and upwards, packed in 1-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride, Solid, 70/75%.—Spot, £5 5s. per ton d/d station in drums.

Chrometan.—Crystals, 3¼d. per lb.; Liquor, £19 10s. per ton d/d U.K.

Chromium Oxide.—10¾d. per lb., according to quantity, d/d U.K.

Methylated Spirits, 61 O.P.—Industrial, 1s. 8d.—2s. 3d. per gal.; Pyridinized Industrial, 1s. 10d.—2s. 5d. per gal.; Mineralized, 2s. 9d.—3s. 3d. per gal. 64 O.P. 1d. extra in all cases. Prices according to quantity.

Nickel Sulphate.—£49 per ton d/d.

Nickel Ammon. Sulphate.—£49 per ton d/d.

Potash, Caustic.—£30—£33 per ton. Potass. Bichromate crystals and granular.—5d. per lb., net d/d U.K., for spot. Discount according to quantity. Ground, 5¾d. per lb.

Potassium Chromate.—6½d. per lb., d/d U.K.

Sal ammoniac, Firsts lump.—Spot, £42 17s. 6d. per ton d/d address in barrels. Chloride of Ammonia.—£37—£45 per ton, carr. paid.

Salt Cake, unground.—Spot, £3 15s. per ton d/d station in bulk.

Soda Ash, 58° E.—Spot, £5 17s. 6d. per ton, f.o.r. in bags, special terms for contracts.

Soda, Caustic, solid 76/77° E.—Spot, £14 5s. per ton d/d station in drums, special terms for contracts.

Soda crystals.—Spot, £5—£5 5s. per ton d/d station or ex depôt in 2-cwt. bags.

Sod. Acetate 97/98%.—£21 per ton. Sod. Bicarbonate (refined).—Spot, £10 10s. per ton d/d station in bags. Sod. Bichromate Crystals, Cake, and Powder.—4d. per lb., net d/d U.K., discount according to quantity. Anhydrous 5d. per lb. Sod. Bisulphite Powder 60/62%.—£16 10s. per ton delivered, 1-cwt. iron drums for home trade.

Sodium Chromate.—3⅜d. per lb., d/d U.K.

Sod. Phosphate.—£12 10s. per ton, f.o.r. London, casks free. Sod. Silicate 140° Tw.—Spot, £8 5s. per ton, d/d station, returnable drums. Sod. Sulphate (Glauber's Salt).—Spot, £4 2s. 6d. per ton d/d. Sod. Sulphide solid, 60/62%.—Spot, £10 15s. per ton, d/d in drums. Crystals, 30/32%.—Spot £8 per ton, d/d in casks. Sod. Sulphite, Pea Cryst.—Spot, £13 10s. per ton, d/d station in kegs; Commercial.—Spot, £9 10s. per ton, d/d station in bags.

RUBBER CHEMICALS

Antimony Sulphide.—Golden.—6½d.—1s. 1½d. per lb., according to quality. Crimson.—1s. 3d.—1s. 5d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 5d.—1s. 7d. per lb.

Barytes.—£7 10s.—£9 per ton, according to quality.

Cadmium Sulphide.—2s. 7d.—2s. 11d. per lb.

Carbon Bisulphide.—£30—£32 per ton, according to quantity, drums extra.

Carbon Black.—3⅜d.—5d. per lb., ex wharf.

Carbon Tetrachloride.—£41—£46 per ton, according to quantity, drums extra.

Chromium Oxide, Green.—1s. 2d. per lb.

Diphenylguanidine.—2s. 2d. per lb.

India-rubber Substitutes, White.—4½d.—4¾d. per lb. Dark.—3½d.—4¼d. per lb.

Lamp Black.—£45—£48 per ton.

Lead Hyposulphite.—9d. per lb.

Lithopone, 30%.—£17 10s.—£18 per ton.

Mineral Rubber "Rupron."—£18 10s. per ton.

Piperidine Rubber Accelerators.—P.P.D.—10s. 6d.—11s. 6d. per lb.; Z.P.D.—7s.—7s. 6d. per lb.; L.P.D.—6s. 6d.—7s. per lb.; P.T.D.—9s. 8d.—10s. 4d. per lb.; C.P.D.—8s. 3d.—8s. 10d. per lb.; S.P.D.—8s. 1d.—8s. 7d. per lb.; P.T.M.—11s. 6d.—12s. 6d. per lb.

Sulphur.—£11 per ton. Sulphur Precip. B.P.—£55—£60 per ton. Sulphur Precip. Comm.—£50—£55 per ton.

Sulphur Chloride.—5d.—7d. per lb., according to quantity.

Vermilion, pale or deep.—4s. 3d.—4s. 5d. per lb.

Zinc Sulphide.—11d.—1s. per lb., according to quality.

WOOD DISTILLATION PRODUCTS

Acetate of Lime.—Brown, £9—£10 per ton. Grey, £16—£17 per ton. Liquor, Brown, 30° Tw., 7d.—8d. per gal.

Charcoal.—£6 10s.—£10 per ton, according to grade and locality.

Methyl Acetone, 40/50%.—£50—£52 per ton.

Wood Naphtha.—Miscible, 3s. per gal. Solvent, 3s. 9d.—4s. 9d. per gal.

Wood Tar.—£2 10s.—£6 per ton.

Wood Creosote.—6d.—2s. 6d. per gal.

TAR PRODUCTS

Acid Carbolic.—Crystals.—9d.—10d. per lb. Crude 60's, 2s. 5d.—2s. 6d. per gal.

Acid Cresylic, 99/100.—1s. 6d.—1s. 9d. per gal. Refined, 1s. 8d.—1s. 9d. per gal. Pale, 98%, 1s. 4d.—1s. 5d. per gal. 95%, 11d.—11½d. per gal. Dark, 10d. per gal.

Anthracene Oil, Strained, 4½d. per gal.

Benzole.—Prices at works: Crude, 10d.—10½d. per gal.. Standard motor, 1s. 5d.—1s. 5½d. per gal.; 90%, 1s. 6d.—1s. 7d. per gal.; Pure, 1s. 8½d.—1s. 9d per gal.

Creosote.—B.S.I. specification, 3d.—3½d. per gal., d/d. Heavy—4d. per gal.

Naphtha.—Solvent, 90/160, 1s. 4d.—1s. 5d. per gal. Solvent, 95/160, 1s. 8d.—1s. 9d. per gal. Solvent 90/190, 11d.—1s. 1d. per gal.

Naphthalene.—Purified crystals, £9 15s. per ton in bags. Crude, Hot Pressed, £6 5s. per ton.

Pitch, medium, soft.—75s. per ton, in bulk at makers' works.

Pyridine.—90/140—5s.—5s. 6d. per gal.; 90/180 2s.—2s. 3d. per gal.

Toluole.—90%, 2s. 9d.—2s. 10d. per gal. Pure, 3s. 3d. per gal.

Xylol.—2s. 9d.—2s. 10d. per gal. Pure, 3s.

PHARMACEUTICAL AND PHOTOGRAPHIC MATERIALS

Acid, Acetic, Pure 80%.—£39 5s. per ton d/d address U.K. in casks.

Acid, Acetyl Salicylic.—2s. 9d.—2s. 11d. per lb., according to quantity.

Acid, Benzoic, B.P.—1s. 9d.—1s. 11d. per lb. Solely ex Gum.—1s. 3d.—1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.

Acid, Boric, B.P.—Cryst., £35 10s. per ton. Powder, £36 10s. per ton. Ex-Fine Powder, £38 10s. per ton. For 1-ton lots and upwards, packed in 1-cwt. bags, carriage paid any station in Great Britain.

Acid, Camphoric.—19s.—21s. per lb.

Acid, Citric.—9½d. per lb. Less 5%.

Acid, Gallic.—2s. 9d. per lb. for pure crystal in 1-cwt. lots.

Acid, Molybdic.—5s. 3d.—5s. 9d. per lb., according to *quantity*.

Acid, Pyrogallic, Cryst.—6s. 9d. per lb. for 1-cwt. lots. Resublimed.—8s. 6d. per lb. for 28-lb. lots d/d.

Acid, Salicylic.—B.P. pulv., 1s. 7d.—1s. 10d. per lb. Technical, 1s. 2d.—1s. 4d. per lb.

Acid, Tannic, B.P.—3s. 9d. per lb.

Acid, Tartaric.—1s. 0½d. per lb. Less 5%.

Acetanilide.—1s. 5d. per lb.

Ammon. Benzoate.—3s. 3d.—3s. 9d. per lb.

Ammonium Hippurate.—19s. 6d.—23s. 6d. per lb.

Ammonium Iodide.—10s. per lb.

Ammonium Molybdate.—5s.—5s. 6d. per lb., according *to quantity*.

Argent. Nitras, Crystal.—1s. 1d. per oz.

Arsenic Iodide.—22s. 6d.—25s. per lb.

Benzonaphthol.—3s. 3d.—3s. 9d. per lb.

Berberine, Hydrochloride.—5s. 6d.—6s. per oz.; Sulphate, 5s. 6d.—6s. per oz.

Bismuth Salts.—Carbonate, 7s. 8d. per lb.; Citrate, 10s. 3d. per lb.; Nitrate (cryst.), 5s. 4d. per lb.; Oxide, 12s. per lb.; Salicylate, 8s. 7d. per lb.; Subchloride, 11s. 8d. per lb.; Subgallate, 8s. 2d. per lb.; Subnitrate, 6s. 9d. per lb. *Above for cwt.* lots. Extra and reduced prices for smaller and larger quantities respectively. Liquor Bismuthi, P.P., in W. Qts.—1s. 1½d. per lb.; 6 W. Qts.—11d. per lb.; 12 W. Qts.—9½d. per lb.; 36 W. Qts.—9d. per lb.

Borax, B.P.—Crystal, £24 10s. per ton. Powder, £25 per ton. For 1-ton lots and upwards, packed in 1-cwt. bags, carr. paid any station in Great Britain.

Bromides, B.P.—Ammonium, 1s. 10d. per lb. Potassium.—1s. 7d. per lb. Sodium.—1s. 9d. per lb. Prices for 1-cwt. lots.

Calcium Hippurate.—26s.—30s. per lb.

Calcium Iodide.—20s. per lb.

Calcium Lactate, B.P.—1s. 2d.—1s. 4d. per lb., according to quantity.

Camphor.—Refined flowers, 3s. 1d.—3s. 2d. per lb. Transparent tablets, 3s. 4d.—3s. 6d. per lb., *according to quantity*; *also* special contract prices.

Chloroform.—2s. 3d.—2s. 8d. per lb.

Cinchophen.—11s. 6d.—12s. 6d. per lb.

Cocaine, Alkaloid and Citrate.—For export.—29s. 10d.—31s. 7d. per oz. Hydrochloride and Nitrate, 27s. 1d.—28s. 11d. *per oz.*

Ephedrine hydrochloride.—5s. 6d.—6s. per oz.

Ergosterol.—2s. 6d. per gm.

Hexamine.—2s. 4d.—2s. 6d. per lb., according to quantity.

Hippuric Acid.—17s. 6d.—21s. 6d. per lb.

Hydrogen Peroxide (12 vols.).—1s. 4d. per gal., f.o.r. makers' works, naked. B.P.—10 vols., 2s.—2s. 3d. per gal.; 20 vols., 3s. per gal.

Hypophosphites.—Calcium, 2s. 9d.—3s. 2d. per lb. *Potassium*.—3s. 4d.—3s. 9d. per lb. *Sodium*, 2s. 11d.—3s. 4d. per lb.

Iodine Resub., B.P.—9s.—11s. per lb.

Iodoform, B.P., Cryst., Precip. or Powder.—10s. 9d.—13s. 7d. per lb.

Iron Ammon. Citrate.—B.P.—1s. 9d. per lb. for 28-lb. lots. Green, 2s. 5d. per lb. (list price).

Iron Perchloride.—18s.—20s. per cwt., according to quantity.

Iron Quinine Citrate, B.P.—10½d.—11½d. per oz., *according to quantity*.

Lithium Carbonate, B.P., 1914.—5s. 4d. per lb.

Lithium Chloride, Cryst.—8s. 3d. per lb.

Lithium Citrate.—5s. 3d. per lb. Powder.—5s. 6d. per lb.

Lithium Hippurate.—18s. 6d.—22s. 6d. per lb.

Lithium Iodide.—20s. 6d.—21s. 6d. per lb.

Magnesium Carbonate.—Light, 28s. per cwt.

Magnesium, Oxide.—Light, 70s. per cwt.; Heavy 1s. 8d. per lb.; in quantity lower.

Menthol.—A.B.R., recryst., B.P., 12s. 6d. *per lb.* net. Synthetic, 8s. 6d.—12s. per lb. Synthetic detached crystals, 8s. 6d.—10s. 6d. per lb., according to quantity; Liquid (95%), 8s. 6d. per lb.

Mercurials, B.P.—Red oxide crystals, 5s. 10d.—5s. 11d. per lb.; Levig, 5s. 4d.—5s. 5d. per lb.; Corrosive sublimate, Lump, 4s.—4s. 1d. per lb.; Powder, 3s. 8d.—3s. 9d. per lb.; White precip., Lump, 4s. 9d.—4s. 10d. per lb.; Powder, 4s. 11d.—5s. per lb.; Calomel, 4s. 9d.—4s. 10d. per lb. Yellow Oxide, 5s. 2d.—5s. 3d. per lb.; Persulph., B.P.C., 4s. 11d.—5s. per lb.; Sulph. nig., 4s. 10d.—4s. 11d. per lb. Special prices for larger quantities.

Mercury, Benzoate.—8s. 3d. per lb.; Cyanide, 12s. 7d.—13s. 1d. per lb.; Oleate (5%), 1s. 11d.—2s. 2d. per lb.; (10%), 2s. 9d.—3s. per lb.; (20%), 3s. 9d.—4s. per lb. Protonitras, 6s. 9d. per lb.; Protosulphate, 7s. 3d. per lb.; Subsulphate flav., 7s. 1d. per lb.

Methyl Salicylate.—1s. 4½d.—1s. 6½d. per lb.

Paraformaldehyde.—1s. 3d.—1s. 5d. per lb.

Paraldehyde.—1s. 3½d.—1s. 9d. per lb., according to quantity.

Phenacetin.—4s.—4s. 6d. per lb.

Phenolphthalein.—4s. 5d.—5s. 8d. per lb.

Potass. Bitartrate.—99/100% (Cream of Tartar), 80s. per cwt., less 2½%.

Potass. Citrate.—B.P., 1s. 7d. per lb. for 28-lb. lots.

Potass Ferricyanide.—1s. 7½d. per lb., in 125-lb. kegs.

Potass. Iodide, B.P.—8s. 3d.—10s. 3d. per lb., according to quantity.

Potass. Permanganate.—8½d. per lb. for 1-ton lots.

Potass. Metabisulphite.—50s. per cwt. d/d London, kegs free.

Potassium Hippurate.—26s.—30s. per lb.

Quinine Sulphate.—2s. per oz., for 100-oz. tins; tins free.

Saccharin.—37s. 6d. per lb., and lower in quantity.

Salicin.—15s.—16s. per lb., according to quantity.

Santonin, B.P.—28s. per oz.

Seidlitz powder (pulv.).—55s.—58s. 9d. per cwt.

Silver Nitrate.—1s. 3¼d. per oz. for quantity. Sticks, 2d. per oz. extra.

Sod. Barbitonum.—13s.—15s. per lb.

Sod. Benzoate, B.P.—1s. 9d.—2s. 3d. per lb., according to quantity.

Sod. Citrate, B.P.C., 1911.—1s. 4d. per lb. B.P.C., 1932, and U.S.P.—1s. 8d. per lb. for 28-lb. lots.

Sodium Hippurate.—23s. 6d.—27s. 6d. per lb.

Sod. Hyposulphite.—Photographic, £15 per ton d/d consignee's station, in 1-cwt. kegs.

Sodium Iodide, B.P.—8s. 6d.—10s. 6d. per lb.

Sod. Nitroprusside.—16s. por lb.

Sod. Potass. Tartrate (Rochelle Salt).—65s. per cwt. net for 1-ton lots. Crystals, 2s. 6d. per cwt. extra.

Sod. Salicylate.—Powder, 2s.—2s. 8d. per lb. Crystal, 2s. 1d.—2s. 9d. per lb.

Sod. Sulphide.—Pure recryst., 10d.—1s. 2d. per lb.

Sod. Sulphide anhydrous.—£23—£25 per ton, according to quantity, d/d U.K.

Tartar Emetic, B.P.—3s. 9d.—4s. 6d. per lb.

Terpine hydrate.—1s. 2d.—1s. 5d. per lb.

Thymol, Puriss.—5s. 9d.—6s. 6d. per lb., according to quantity. Natural.—12s. per lb.

Zinc Stearate.—1s. 3d.—1s. 8d. per lb.

PERFUMERY CHEMICALS

Acetophenone.—7s. per lb.

Aubepine (*ex Anethole*).—8s. per lb.

Amyl Acetate.—2s. 3d. per lb. Amyl Butyrate.—4s. per lb. Amyl Cinnamic Aldehyde.—8s. 3d. per lb. Amyl Salicylate.—2s. 9d. per lb. Anethol, 21/22° C., 4s. 9d. per lb.

Benzaldehyde free from Chlorine.—2s. 9d. per lb.

Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. per lb. Benzyl Alcohol free from Chlorine.—2s. per lb. Benzyl Benzoate, 2s. 3d. per lb.

Cinnamic Aldehyde.—Natural, 12s. 3d. per lb.

Citronellol.—8s. 6d. per lb.

Citral.—7s. per lb.

Coumarin.—15s. per lh.

Ethyl Cinnamate.—8s. 6d. per lb.

Ethyl Phthalate.—2s. 6d. per lb.

Eugenol.—7s. 3d. per lb. Geraniol (Palmarosa).—17s. per lb. Geraniol.—6s. 6d.—11s. per lb. Heliotropine.—6s. per lb. Iso Eugenol.—8s. 6d. per lb. Linalol.—(*ex Bois de Rose*), 6s. 3d. per lb.—(*ex Shui Oil*) 5s. 6d. per lb. Linalyl Acetate.—(*ex Bois de Rose*), 7s. 6d. per lb.—(*ex Shui Oil*) 6s. 6d. per lb.

Methyl Anthranilate.—9s. per lb.

Methyl Benzoate.—4s. 6d. per lb.

Musk Ketone.—33s. per lh.

Musk Xylol.—8s. per lb.

Nerolin.—5s. per lb.

Phenyl Ethyl Acetate.—10s. per lb.

Phenyl Ethyl Alcohol.—8s. 6d. per lb.

Rhodinol.—60s. per lb. Safrol.—1s. 6d. per lb. Terpineol.—2s. per lb. Vanillin (*ex Clove Oil*).—14s. 3d.—16s. 3d. per lb.—(*ex Guaiacol*)—14s. 3d.—16s. 3d. per lb.

ESSENTIAL OILS

Almond.—Foreign S.P.A., 9s. per lb. Anise.—2s. 1d. per lb. Bergamot.—7s. per lb. Bourbon Geranium.—24s. 3d. per lb.

Camphor.—Brown, 75s. per cwt.—White, 95s. per cwt. Cananga, Java, 10s. 6d. per lb. Cinnamon Oil, Ceylon.—3s. 3d. per lb. Cassia, 80/85%, 4s. 3d per lb.

Citronella Oil.—Java, 2s. 1d. per lb. Ceylon, 2s per lb. Clove.—90/92% English, 4s. 3d. per lb.

Eucalyptus, Australian B.P., 70/75%.—1s. 2d. per lb Lavender.—Mont Blanc, 38/40%.—18s. 6d. per lb Lemon.—5s. per lb. Lemongrass.—4s. 6d. per lb Orange, Sweet.—6s. 6d. per lb. Otto of Rose.—Anatolian, 33s. per oz.; Bulgarian, 45s. per oz. Palma Rosa, 8s. 6d. per lb.

Peppermint.—Japanese, 4s. per lb. Wayne County 12s. 6d. per lb. Petitgrain.—5s. 6d. per lb.

Sandalwood, Mysore.—30s. per lb. 90/92%, 20s. 6d per lb. Australian, B.P. and French Codex, 92/95%, 15s. 6d. per lh.

INTERMEDIATES

Items marked thus * d/d buyers' works.

*Acid, Benzoic, 1914 B.P. *ex Toluol*.—1s. 9½d. per lb. in casks.

*Acid Gamma.—Spot, 4s. per lb., 100%.

*Acid H.—Spot, 2s. 4½d per lb., 100%.

*Acid Neville and Winther.—Spot, 3s. per lb., 100%.

*Acid Sulphanilic, 8d. per lb.

*Aniline Oil, spot, 8d. per lb., drums extra.

*Aniline Salts, spot, 8d. per lb., casks free.

*Benzaldehyde, spot, 1s. 8d. per lb., packages extra.

*Benzidine Base.—Spot, 2s. 5d. per lb., 100%.

o-Cresol 30/31° C.—£2 6s. 5d. per cwt. in 1-ton lots.

m-Cresol 98/100%.—2s. 3d. per lb., in ton lots.

p-Cresol 34.5° C.—1s. 9d. per lb., in ton lots.

Dichloraniline.—2s. 3d. per lh.

*Dimethylaniline.—Spot, 1s. 6d. per lb., packages extra.

Dinitrobenzene.—8d per lb.

Dinitrotoluene 48/50° C.—8½d. per lb. 66/68° C.—10d. per lb.

*Diphenylamine.—Spot, 2s. per lb.

*α-Naphthol.—Spot, 2s. 4d. per lb.

*β-Naphthol.—Spot, £78 15s. per ton, in paper bags; £79 15s. per ton in casks, in 1-ton lots.

*α-Naphthylamine.—Spot, 11½d. per lb.

*β-Naphthylamine.—Spot, 2s. 9d. per lb.

o-Nitraniline.—5s. 10d. per lb.

**m*-Nitraniline.—2s. 7d. per lb.

**p*-Nitraniline.—Spot, 1s. 8d.—2s. 1d. per lb.

*Nitrobenzene.—Spot, 4½d. per lb., in 90-gallon drums, drums extra. 1-ton lots.

Nitronaphthalene.—9d. per lb.

*Sodium Naphthionate.—Spot, 1s. 9d. per lb., 100%.

**p*-Toluidine.—Spot, 1s. 11d. per lb.

**o*-Toluidine.—Spot, 9½d. per lb., drums extra.

m-Xylidine acetate, 4s. 6d. per lb., 100%.

PATENT LIST

..e following is a list of complete specifications of chemical interest which ..pen for inspection under Section 91 (4) (a) of the Patent Acts. Printed ..es are not available, but photographic copies may be obtained at a charge .. per page (minimum 1s.) from the Patent Office, Chancery Lane, W.C.2

I ..,810 (1932). Perez. *Catalytic reactions.*

..756 (1933). Bataafsche Petroleum Maats. Splitting .. liquid mixture into its components or groups of ..ponents.

II 12,062 (1933). Soc. des Carburants Synthetiques. ..verting phenolic bodies and low-temperature tars into ..drocarbons.

..347 (1933). *Verein. Stahlwerke. Treating gas* ..

..876 (1933). Jana. Preparation of hydrocarbon .. fuels from oxygen-containing organic compounds.

III 4922 (1933). Resinous Products & Chem. Co. *See* XIII.

12,062 (1933). Soc. des Carburants Synthetiques. *See* II.

13,367 (1933). Du Pont de Nemours & Co. Production .. ters.

..537 (1933). Chem. Fabr. Stockhausen & Co. *See* VI.

..781 (1933). *I. G. Farbenind. Manufacture of* ..atives of the anthraquinone series.

IV. 13,606 (1933). Soc. *Chem. Ind. in Basle. Manu*..ture of azo-dyestuffs.

13,625 (1933). I. G. Farbenind. Manufacture of azo-dyestuffs of the stilbene series.

..785 (1933). I. G. Farbenind. Manufacture of dye-stuffs.

V. 13,562 (1933). Carrier-Ross Engineering Co. *Method of coating paper.*

13,857 (1933). I. G. Farbenind. Boiling out or kie..ting vegetable fibres.

13,904 (1933). Celluloid Corp. *See* XIII.

VI 13,537 (1933). Chem. Fabr. Stockhausen & Co. Wetting, penetrating, dispersing, foaming, and ..ansing agents.

13,761 (1933). *Durand & Huguenin A.-G. Producing* ..st dyeings and printings on animal fibres by means of ..id mordant dyestuffs.

13,857 (1933). I. G. Farbenind. *See* V.

VII. 985 (1933). I. G. Farbenind. Preparation of acid solutions.

987 (1933). I. G. Farbenind. Packing phosphorus ..*hlorides.*

13,186 (1933). Atmospheric Nitrogen Corp. Ammonium compounds.

VIII. 13,515 (1933). Glaswerk Fischer. Producing a luminescent inorganic glass.

IX. 13,475 (1933). Soc. Chem. Ind. in Basle. Thermal, electrical, or other insulation.

13,602 (1933). Soc. Chem. Ind. in Basle. Thermal, electrical, or other insulation of articles.

X. 2135 (1933). Aluminium, Ltd. Aluminium bronze powder.

12,637 (1933). *Soc. d'Electro-Chimie,* d'Electro-Métall, et des Aciéries Electriques d'Ugine. Manufacture *of* steel.

12,638 (1933). Soc. d'Electro-Chimie, d'Electro-Métall, et des Aciéries Electriques d'Ugine. Deoxidizing slag.

13,689 (1933). *Kodak, Ltd. Production of metal* castings from gelatin and like reliefs.

14,006 (1933). Gillette Safety Razor Co. Treating metal.

31,610/1 (1933). Soc. d'Electro-Chimie, d'Electro-Métall, et des Aciéries Electriques d'Ugine. Deoxidizing steel.

XI. 13,475 and 13,602 (1933). Soc. Chem. Ind. in Basle. *See* IX.

13,775 (1933). Kelsen Special Sheet Holding Soc. Anon. Fixing anode material in electrolytic cells.

XIII. 2135 (1933). Aluminium, Ltd. *See* X.

4922 (1933). Resinous Products & Chem. Co. Condensation product of *castor oil with half ester of maleic* acid.

13,275 (1933). Weeks & Co. (London). Manufacturing pigmented protective coatings.

13,904 (1933). Celluloid Corp. Preparation or treatment *of artificial materials.*

13,982 (1933). Du Pont de Nemours & Co. Manufacture of synthetic resins.

XIV. 11,361 (1933). I. G. Farbenind. Manufacture of rubber derivatives.

XV. 23,866 (1932). Tanning Process Co. Treating hides or skins.

XX. 11,729 (1933). Schering-Kahlbaum A.-G. Production of the corpus luteum hormone.

13,754 (1933). *I. G. Farbenind. Manufacture of* therapeutically-active preparations.

13,833 (1933). Erhard and Schaefer. Manufacturing a remedy containing an emanation.

XXI. 11,580 (1933). Philips' Gloeilampenfabr. Making photographic prints.

13,689 (1933). Kodak, Ltd. *See* X.

XXIII. 12,205 (1933). Guggenheim, Guggenheim, Guggenheim, Smith, Howland, and Whelpley. Treating sewage.

GENERAL NOTES

Official Trade Intelligence

The Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1, has *received the following inquiries for British goods.* British firms may obtain further information by applying to the Department and stating the specific number. *Australia:* Thermostats (563). *Belgium:* China clay, resinous soap for paper mills, paints and insulating varnish for the electrical industry (579). *Brazil:* Fish-plates (G.Y. 13,157). *British India.* Paper (Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1). *Egypt:* Sterilizing apparatus (B.Y. 7707). *Iraq (Bagdad). Centrifugal pumps (592). South Africa:* Air compressors etc. (G.Y. 13,152). *Switzerland:* Specialities in paints and varnishes, air purifying and conditioning apparatus, novelties in the chemical technical line (590). *Turkey:* Tinplates, tin, zinc (595).

Import Duties Advisory Committee

The Import Duties Advisory Committee gives notice *of the applications for increases in the import duty on* (i) plates, sheets, strip, circles and discs, bars (other than notch bars), rods, wire, tubes, angles, shapes, and sections of aluminium or alloys of aluminium containing more than 50% by weight of aluminium; (ii) aluminium foil.

The Committee has also received applications for the variation of the existing additional duties on certain

fruits preserved by chemicals or artificial heat, other than fruit preserved in sugar, by the substitution therefor of additional duties at specific rates, and for the extension of the additional duties on fruit preserved by chemicals or artificial heat to fruit preserved by artificial freezing, other than fruit preserved in sugar.

Representations in regard to these applications should be addressed to The Secretary, Import Duties Advisory Committee, Caxton House, Tothill Street, London, S.W.1, not later than December 11, 1933.

The Dyson Refrigerated Containers

As was mentioned in CHEMISTRY AND INDUSTRY last week a range of new insulated containers has been developed by R. H. Dyson & Co. for the transport of perishable foodstuffs. The insulation employed is "Drikold" solid CO_2 manufactured by Imperial Chemical Industries, Ltd.

The most popular body of the range, for the transport of chilled or frozen meat, is an insulated trailer having internal dimensions 13 ft. long by 6 ft. 6 in. wide by 6 ft. 10 in. high, giving a capacity of approximately 575 cb. ft. It has been designed for a load of 8–10 tons, and in certain models is fitted with rails running at intervals from side to side near the roof, from which meat may be hung. A 4-in. air space on every side of the body, including the gas-tight doors, is fitted with layers of a patented insulation material known as "Alfol," consisting of sheets of crinkled aluminium foil, which by its extreme lightness is ideally suited to refrigerated vehicles of all types.

The refrigeration equipment consists of two bunkers, one at each end of the body, each capable of holding 100 lb. of "Drikold," and each fitted with a finned conductor plate which serves to abstract the heat from the atmosphere and to conduct it to the "Drikold." Arrangement is made for the gas given off by the "Drikold" to be pumped either into the refrigerated space of the body, or into the outside atmosphere, or into the insulation; the point of the last arrangement is to improve the efficiency of the insulation, dry carbon dioxide gas being a poorer conductor of heat than the air which would otherwise be present. The "Drikold" is loaded into the equipment through the roof, an arrangement which renders unnecessary the opening of the main doors of the trailer, should it be found necessary to "re-ice" at intervals during a very long journey.

Thus use is made not only of the properties of solid CO_2 as a refrigerant, but also of the bactericidal and fungicidal properties of the CO_2 gas. For this reason the doors of the Dyson-"Drikold" vans are made completely gas-tight. The method of construction ensures efficient cooling, with the least possible quantity of "Drikold," whilst a hand-wood grill covering the floor, and channel strips fixed vertically on the walls, prevent contact of the contents with the floor and wall surfaces, which are of galvanized steel sheet and can be easily cleaned. Tests carried out on the transport of frozen meat in this trailer on journeys from Liverpool to Smithfield Market have proved entirely satisfactory.

The sales and distribution of the Dyson-"Drikold" refrigerated containers, both at home and abroad, are controlled by the Frigid Transport Equipment Co., Abbey House, Baker Street, London, N.W.1.

A New I.C.I. Dyestuff

Imperial Chemical Industries, Ltd. has add[ed] Solochrome 4RS to its range of Solochrome dyestu[ffs]. It possesses excellent affinity for the wool fibre wh[en] dyed in the manner usual for chrome dyestuffs, a[nd] yields bright red-violet shades which possess good [to] very good fastness properties. For dyeing natural s[ilk] it may be applied by the afterchrome or chromiu[m] chloride mordant methods, and is also of value wh[ere] chrome dyestuffs are required as ground shades for t[he] production of discharge styles.

Aluminium in Architecture

Aluminium and its alloys have come to be used [a] good deal in modern architecture for they are eas[ily] used to provide the simplicity of form and colour contrasts which are the trend of architectural des[ign] to-day. Aluminium in the commercially pure st[ate] is a pearl-white colour and the silicon alloys are a r[ich] slate grey. A high polish can be obtained with [the] metal, or it can be given an attractive "matt" fini[sh] whilst the oxide film which forms on the pure me[tal] is both protective and can be treated to give opa[que] or iridescent effects. This film will also hold a num[ber] of dyes.

The many uses of aluminium in architectural w[ork] are well described in a booklet "Aluminium in Arc[hi]tecture and Decoration," issued by the British Alumini[um] Co., Ltd. of Adelaide House, King William Str[eet], London, E.C.4. The booklet is one of the most excell[ent] productions of its type that we have seen, and the pho[to]graphs are somewhat astonishing in the widespr[ead] use of aluminium which they demonstrate.

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